PROCEEDINGS

OF THE

TWENTY-FIFTH ANNUAL MEETING

OF THE

FLORIDA STATE HORTICULTURAL SOCIETY

HELD AT

MIAMI, MAY 14, 15, AND 16, 1912

COMPILED BY THE SECRETARY
PUBLISHED BY THE SOCIETY

CONSTITUTION

ARTICLE 1. This organization shall be known as The Florida State Horticultural Society, and its object shall be the advancement of horticulture.

ARTICLE 2. Any person may become a member of the Society by subscribing to the Constitution and paying one dollar. Any person may become a Life Member of the Society by subscribing to the Constitution and paying ten dollars.

ARTICLE 3. Its Officers shall consist of a President, three Vice Presidents, Secretary, Treasurer, and Executive Committee of three, who shall be elected by ballot at each annual meeting. After the first election, their term of office shall begin on the first day of January following their election.

ARTICLE 4. The regular annual meeting of this Society shall be held on the second Tuesday in April, except when otherwise ordered by the Executive Committee.

ARTICLE 5. The duties of the President, Vice President, Secretary and Treasurer shall be such as usually devolve on those officers. The President, Secretary and Treasurer shall be ex-officio members of the Executive Committee.

ARTICLE 6. The Executive Committee shall have authority to act for the Society between annual meetings.

ARTICLE 7. The Constitution may be amended by a vote of two-thirds of the members present.

BY-LAWS

1. The Society year shall be co-extensive with the calendar year, and the annual dues of Members shall be one dollar.

2. All bills authorized by the Society or its Executive Committee, for its legitimate expenses, shall be paid by the Secretary's draft on the Treasurer, O. K.'d by the President.

3. The meetings of the Society shall be devoted only to Horticultural topics, from scientific and practical standpoints, and the Presiding Officer shall rule out of order all motions, resolutions and discussions tending to commit the Society to partisan politics or mercantile ventures.

Florida State Horticultural Society

OFFICERS ELECT FOR 1912:

PRESIDENT:

H. HAROLD HUME, Glen St.Mary.

VICE PRESIDENTS:

H. B. STEVENS, DeLand; W. C. TEMPLE, Winter Park; L. B. SKINNER, Dunedin.

SECRETARY:

E. O. PAINTER, Jacksonville.

TREASURER:

W. S. HART, Hawks Park.

EXECUTIVE COMMITTEE:

P. H. ROLFS, Gainesville; E. S. HUBBARD, Federal Point; G. L. TABER, Glen St. Marys.

President, Secretary and Treasurer, ex-officio.

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Standing Committees

Methods of Packing and Shipping Citrus Fruits.—L. B. Skinner, Dunedin, Fla.; H. B. Stevens, DeLand, Fla.; D. T. McCarty, Eldred, Fla.; E. H. Mote, Leesburg, Fla.

Methods of Handling Citrus Groves.—Wm. Edwards, Zellwood, Fla.; T. Ralph Robinson, Terra Ceia, Fla.; W. J. Ellsworth, Blanton, Fla.; E. V. Blackman, Miami, Fla.

Ornamentals.—H. Nehrling, Gotha, Fla.; Mrs. Marian A. McAdow, Punta Gorda, Fla.; Mrs. F. M. Loughlin, Orlando, Fla.; Prof. Chas. T. Simpson, Little River, Fla.; John Schnabel, Gainesville, Fla.

Irrigation.—C. H. Thompson, Winter Haven, Fla.; A. M. Griffing, Little River, Fla.; Walter Drennen, Orlando, Fla.

Vegetables.—Chas. Montgomery, Buena Vista, Fla.; S. H. Gaitskill, McIntosh, Fla.; A. B. Lowe, Zona, Fla.; C. K. McQuarrie, Gainesville, Fla.

Peaches and Deciduous Fruits.—C. M. Griffing, Jacksonville, Fla.; W. L. Floyd, Gainesville, Fla.; E. H. Hayward, DeLand, Fla.

Pineapples.—Mrs. P. H. Rolfs, Gainesville, Fla.; W. R. Hardee, Jensen, Fla.; G. A. Saeger, Ankona, Fla.

Fertilizers.—Prof. S. E. Collison, Gainesville, Fla.; W. M. Atwater, Quay, Fla.; C. H. Cresson, City Point, Fla.; E.S.Williams, Ft. Pierce, Fla.

Tropical Fruits.—E. N. Reasoner, Oneco, Fla.; L. H. Gurney, Merritt, Fla.; C. G. White, Haiku, Moui Island, Hawaii. Dr. John Gifford, Cocoanut Grove.

Insects and Diseases.—J. A. Stevens, South Jacksonville, Fla.; Roland E. Stevens, Daytona, Fla.; H. E. Stevens, Gainesville, Fla.

Nuts.—H. K. Miller, Monticello, Fla.; J. B. Curtis, Orange Heights, Fla.; F. P. Henderson, Gainesville, Fla.; H. S. Graves, Gainesville. Fla.

Necrology.—E. S. Hubbard, Federal Point, Fla.; Edgar A. Wright, Tampa, Fla.

Legislation.—M. E. Gillett, Tampa, Fla.; E. O. Painter, Jacksonville, Fla.; G. L. Taber,, Glen St. Mary, Fla.; I. A. Stewart, DeLand, Fla.; O. W. Conner, Tangerine, Fla.; E. H. Mote, Leesburg, Fla.

List of Members

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Gaitskill, S. H., McIntosh, Fla.
Hart, W. S., Hawks Park, Fla.
Painter, E. O., Jacksonville, Fla.

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Andrews, C. W., Chicago, Ill., John Crerar Library.

Baltram, Francisco, Monterey, N. L., Mexico.
Barber, C. F., Macclenny, Fla.
Bartlett, A. F., St. Petersburg, Fla.
Beach, John B., West Palm Beach, Fla.
Bell, J. D., St. Petersburg, Fla.
Budd, H. S., Leesburg, Fla.

Carpenter, G. F., Attleboro, Mass., 50 Beck St.
Champlain, A. E., Palmetto, Fla., R. F. D. No. 1.
Chidester, D. D., Phila, Pa., 2321 Madison Sq.
Cook, R. F. E., Leesburg, Fla.
Conner, O. W., Tangerine, Fla.
Conner, W. E., New York City, 31 Nassau St.
Cresson, W. H., City Point, Fla.
Crutchfield & Woolfork, Pittsburg, Pa., Penn. Produce Bldg., 21st St.
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Cunliff, L. H., East Douglass, Mass.
Cunningham, A. D., St. Louis, Mo., 421 Olive St.

Drew, Prof. Wm. L., Ithaca, N. Y., 13 East Ave.

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Felt, J. P., Emporia, Fla.
Francis, Chas., Jr., Interlachen, Fla.
Frink, Aubrey, Winchester, Tenn.

Gillett, M. E., Tampa, Fla.
Gossard, Prof. H. A., Wooster, Ohio, Ohio Experiment Station.
Gushee, E. G., Phila., Pa., 2830 W. Lehigh Ave.
Griffing, C. M., Jacksonville, Fla.

Haden, Mrs. Florence P., Cocoanut Grove, Fla.
Harris, E. K., East Palatka, Fla.
Harris, Mrs. A. C., East Palatka, Fla.
Harvey, S. S., Havana, Cuba, 99 Prado.
Hastings, H. G., Atlanta, Ga., 35 Marietta St.
Hempel, H. A., Gotha, Fla.
Henricksen, H. C., Havana, Cuba.
Hentz, W. B., City Point, Fla.
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Hooper, I. A., Orlando, Fla.
Hume, H. Harold, Glen St. Mary, Fla.
Hubbard, E. S., Federal Point, Fla.
Hutchinson, R. H., New York City, 51 Front St.

Johnston, S. W., DeLand, Fla.

Kerr, Dr. George, Hampton, Va., 325 Armstead Ave.
Krome, W. J., Marathon, Fla.

Lauman, G. N., Ithaca, N. Y.
Lewis, Dr. Fred D., Buffalo, N. Y., 188 Franklin St.
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Manville, Mrs. A. H., Orange City, Fla.
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Mills, C. D., Jacksonville, Fla.
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Myer, H. Van W., Cocoanut Grove, Fla.
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McCarty, B. K., Eldred, Fla.
McCarty, D. T., Ft. Pierce, Fla.

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Porcher, Mrs. E. P., Cocoa, Fla.

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Rolfs, Mrs. P. H., Gainesville, Fla.

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Temple, Mrs. W. C., Tampa, Fla.

Waite, F. D., Palmetto, Fla.
Wester, P. J., Bureau Agriculture, Philippine Islands.
White, C. G., Haiku, Maui Island, Hawaii.
Williams, E. S., Ft. Pierce, Fla.
Wilson, L. A., Jacksonville, Fla.
Woodroffe, Auckland, New Zealand.
Worcester, C. H., Pomona, Fla.

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Adams, Ira E., Cocoanut Grove, Fla.
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Allen, Dr. Chas. D., Palmetto, Fla.
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Fossey, Hubert, Buena Vista, Fla.
Foster, Davis, Hawks Park, Fla.
Foster, Frank, Orchid, Fla.
Foster, Mrs. Frank, Orchid, Fla.
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Froscher, Andrew, Titusville, Fla.
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Galloway, Mrs. J. R., Okahumpka, Fla.
Galloway, Miss Laura, Okahumpka, Fla.
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Garrison, C. C., Jensen, Fla.
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Gildersleeve, Miss Ruth, Palatka, Fla.
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Gibbons, George H., Winter Haven, Fla.
Gifford, Dr. John C., Cocoanut Grove, Fla.
Gifford, Mrs. John C., Cocoanut Grove, Fla.
Glass, Rev. Jas. G., Anniston, Ala.
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Gossard, Fred A., Clermont, Fla.
Gould, L. W., Eustis, Fla.
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Grant, A. J., Dunedin, Fla.
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Gore, Mrs. C. Groninger, Orlando, Fla.
Gore, Mahlon, Orlando, Fla.
Goodrich, Chas., Coruthersville, Mo.
Graves, H. S., Gainesville, Fla.
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Green, Mrs. James A., Florence Villa, Fla.
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Griffin, S. L., Wauchula, Fla.
Griffing, A. M., Miami, Fla.
Griffing, Mrs. A. M., Miami, Fla.
Griffing, Mrs. C. M., Jacksonville, Fla.
Griffing, D. W., Miami, Fla.
Griffing, W. C., McAllen, Texas.
Griffing, W. D., Port Arthur, Texas.
Gumprecht, H. G., Bradentown, Fla.
Gurney, L. H., Merritt, Fla.

Hadin, V. G., Fellsmere, Fla.
Hagstrom, Fred, Pierson, Fla.
Hall, C. C., Bonaventure, Fla.
Hall, E. B., Jr., Winter Haven, Fla.
Hall, M. E., Jr., Fellsmere, Fla.
Hall, W. W., Miami, Fla.
Hallatt, H. H., Tampico, Mexico, Apartado, 150.
Haley, D. E., Ocala, Fla.
Hallstrom, N., Viking, Fla.
Hamm, H. O., Palatka, Fla.
Hamm, Mrs. H. O., Palatka, Fla.
Hamm, W. T., Palatka, Fla.
Hammerick, C., New Smyrna, Fla.
Hammerick, F., New Smyrna, Fla.
Hardee, Mrs. Carolyn A., Jensen, Fla.
Hardee, G. S., Rockledge, Fla.
Hardee, W. R., Jensen, Fla.

Harer, E. E., Stemper, Fla.
Harrington, A. B., Winter Haven, Fla.
Harrington, Mrs. A. B., Winter Haven, Fla.
Harrington, C. W., Winter Haven, Fla.
Harrington, Mrs. C. W., Winter Haven, Fla.
Harris, Chas., Vero, Fla.
Harris, J. A., Winter Park, Fla.
Harris, W. H., Walton, Fla.
Harris, Mrs. W. H., Walton, Fla.
Harrison, F. E., W. Palm Beach, Fla.
Harrison, W. G., Winter Haven, Fla.
Harrison, Mrs. W. G., Winter Haven, Fla.
Harrsen, Ferdinand, Pineland, Fla.
Hartman, D. L., Little River, Fla.
Hartman, E., Ft. Pierce, Fla.
Hasseltine, J. A., Miami, Fla.
Haskins, Earl L., Winter Haven, Fla.
Hathaway, W. W., Jacksonville, Fla., Box 210,
Hayden, Ben H., Omaha, Neb., care Chatham Hotel.
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Hazen, Mrs. Lydia A., Thonotosassa, Fla.
Head, John A., Owensboro, Ky., Planters House.
Heitman, H. E., Ft. Myers, Fla.
Henley, Dr. A., Melbourne, Fla.
Henry, A. M., Tallahassee, Fla.
Henry, Mrs. W. T., Lake City, Fla.
Herron, John, Miami, Fla.
Hibbard, E. C., Daytona Beach, Fla.
Hickok, C. O., Miami, Fla.
Hildrup, Mrs. E. J., Welaka, Fla.
Hill, E. M., South Jacksonville, Fla.
Hinkley, B., Avon Park, Fla.
Hobbs, W. A. H., Cocoanut Grove, Fla.
Hoeflich, Jas. Lynn, Eldred, Fla.
Holland, B. F., Bartow, Fla.
Hoomberg, Dr. J. L., Miami, Fla.
Hood, Samuel C., Orange City, Fla.
Houghtalin, F. E., McKinley, Isle of Pines.
Hourihan, Mrs. J., Miami, Fla., 221 14th St.
Houser, Theo. G., Miami, Fla.
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Robinson, W. E., Palmetto, Fla.
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Russell, E. T., Ormond, Fla.

Sadler, J. H., Oakland, Fla.
Sadler, Mrs. J. H., Oakland, Fla.
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Sewell, John, Miami, Fla.
Seyler, Daniel, Lady Lake, Fla.
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Shillaber, C. F., Portsmouth, N. H.
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Proceedings of the Twenty-fifth Annual Meeting of the Florida State Horticultural Society

The members of the Florida State Horticultural Society that attended the twenty-fifth annual meeting at Miami were not disappointed in anything. Miami and the Florida East Coast made good all of their promises and the Socciety can acknowledge that the attendance at the Miami meeting was the largest since the meeting there years ago and the program was one of the best, as will be seen from this report. The Society never enjoyed as many good papers or as many good lectures or as many good speakers as on this occasion. The accommodations for the members at Halcyon Hall were all that could be asked and the use of their auditorium made the meeting very pleasant. The entertainment committee headed by Mr. E. V. Blackman left nothing undone to give the members a pleasant time.

The launch ride to the beach with its magnificent bathing in the ocean furnished an afternoon of great pleasure to the members, especially those from the interior. The launch ride up the Miami River and New Canal to the Everglades gave the members some idea of the wonderful work that is being done to drain the Everglades and to bring into use thousands of acres of now glade-land.

The automobile ride through the city and the surrounding country and the visit to different groves was a feature that the Horticulturists, especially those engaged in orange growing, greatly enjoyed. The stop at Mr. Griffing's home, of the Griffing Nursery Company, is a bright spot on the trip, where Mrs. Griffing and her friends dispensed refreshing, cool drinks to the thirsty horticulturists. As may be seen from the final resolutions, the Society acknowledges that Miami made good and then some. Besides furnishing a splendid entertainment, Miami helped to roll up the number of members so that at present, our list is the largest of any year since the meeting in Miami nine years ago.

When the question of the next place of meeting was taken up, Palatka, DeLand and Fort Myers were mentioned. Fort Myers, however, did not have any delegates present, but Palatka and DeLand had their "fighting clothes" on. Nomi-

nating speeches were made on both sides, but Dr. Kerr won the day for DeLand, therefore the twenty-sixth annual meeting will be held at DeLand next May. DeLand has had the pleasure of entertaining the Horticultural Society before, and it was here that the first stenographic report of the Society's proceedings was taken for publication in the Florida Agriculturist. DeLand will not be able to give the members any "Over the Sea" trips, but they will be able to entertain the Society in their usual royal manner and among other things have promised the members a trip to the "Beach" with an opportunity to bathe in the "Briny deep."

After the adjournment of the Society about two hundred and forty visited Cuba. A description of the trips will be found in another part of the report.

Address of Welcome

Dr. J. N. MacGonigle

Mr. President, Ladies and Gentlemen:

After the jolly voices of these boys,* I do not want to strike a note of regret, but I cannot help from stating my sorrow that the Mayor of our city is not here tonight. Those of us who know him, can readily imagine the stirring words of welcome he would have spoken in behalf of the city of which he has been a most upright, efficient and capable Mayor; and how cheerfully and heartily and with the big, broad spirit which characterizes him, he would have handed to you the keys of this city and made you welcome to everything that it contains.

I am sure that in welcoming you with every hearty expression I can think of, I will not go beyond the warmth which the Board of Trade has authorized me to show. As you know, the Board of Trade is an organization made up of the most reputable citizens in any city. The principal business of the Miami Board of Trade is to see that the City of Miami is so placed on the map of the world that it looks as though it had London and Paris on the east, Jacksonville and Chicago on the north, the Panama Canal on the outskirts of the south, and the Everglades on the west. There are some who would be willing to admit that from the extreme western edges of the Everglades you might discern Tampa and St. Petersburg, but remember, however, that you will be asked to keep in mind the fact that New Orleans and San Francisco are in the middle distance. (Laughter.)

You may surmise that I am not particularly modest in my claims, but you must know that I am simply the exponent of a feature in the growth of any town for there is no element in a community which can do as much harm or as much good, as its Board of Trade; that pushes forward its interests; that forms its friends; that lays the strong hand of restraint upon its weaknesses and its vices; that magnifies and makes much of its opportunities, and that shows the world those opportunities and reveals to men its merits and the chances that it gives to all who are ready to enter into the struggles of life with an eye to what those struggles will bring them in the end.

We are very glad, Mr. President, and ladies and gentlemen of the Society, to welcome you here, for two good reasons. I will state the lesser reason first. We welcome you because we people who live here in this south of Florida, believe it

*Just before the opening address the High School Glee Club gave a few choice selections that were greatly enjoyed.

to be the most promising field that all the world presents for horticultural work, in the truest, biggest, broadest sense. The splendid empire to the west of us about which so much has been said and so much has been written, is as yet undeveloped. Its promises are great but yet unknown. Its pledges have been made and many of them will be kept, but, leaving out that splendid empire, we offer you as a Society, we offer to the world, four hundred square miles of a territory that cannot be duplicated anywhere eise in the United States. There is any kind of soil you like, from the deep, practically exhaustless muck lands of our prairies to those high and splendid areas of sand and rock that produce a pineapple unsurpassed by anything grown in the United States, and the grapefruit whose golden glow takes no blush from anything that comes from any part of Florida or from the United States.

You see how modest I am. (Laughter.)

The land can produce any fruit that is native to the tropical or sub-tropical area. We would be very glad to have you come down here in one big, solid body. We have room for your heart, for your brain, for your splendid history in the past and your high-minded, splendid work in the future, and with both arms open we bid you welcome to this great, big neighborhood of ours, not only for this thirty-six hours you will be here, but for the next three years, the next thirty years, the next thirty centuries, for you and your children and your children's children.

But if you are not ready to come now, we will be glad to see your President and Secretary settle right down here and stay with us, as soon as they can sell out their business interests where they are. (Laughter). We need men of their type.

The second big reason why we welcome you is this; there is nothing today in the history of the State of Florida that has accomplished more for the development of the State for its judicious, honest advertisement, than just the Horticultural Society. As an indication of this, I would point to the reports you have issued from year to year. Think of the results accomplished in the way of making the products of the State of Florida known. If we did not have the garden to offer you to work in as a reason for our welcome, your own splendid organization, your own magnificent results, your own successful work, would be reason why we would extend both hands to you and say to you, "Come every year, and we will make you just as welcome as we do now; if you are not ready to accept our broader invitation and telegraph home for the rest of the things you own and the people you love, and just stay right here."

Mr. President, as I listened this morning to the few brief reports we had the pleasure to hear of your standing committee, as I read the list of your committees and the work they had in charge, it seemed to me that I wanted to say to you tonight that honest farmers like myself,—for that is my chief occupation in life—have no conception of the work this Society is doing to build up the fundamental wealth and riches of this State.

I did not conceive of it, although I have read the reports from year to year from cover to cover, until I listened to the men speak; men with keenness, with intelligence, men of science and of specialization, about how to treat the soil and then how to treat the growing thing, and after that how to handle the result. It is a great life work; it is a work that is linked to the hand of God, when the worker can see in Nature but one of the myriad phases of that power that is in us all, and that is over us all; that Power which we call by many names, but which we know by that one endearing name—the name of that perfect Father from which every fatherhood is named.

So we welcome you, not only as men and women, but as horticulturists, who have made two blades of grass grow where one grew before. Through your intelligence, your earnestness, at a cost to yourselves extending through years, the possibilities of our State have been demonstrated, and the desert of Florida has been made to blossom as the rose? You have made the waste places bloom under God's sunshine, until ten thousand times ten thousand have come as streams of God's light to enrich these lands of ours. Why should we not throw Miami open to you, heart and soul! Why should we not give to you the very best we have and ask you to stay with us, and if you cannot do that, enjoy it all to the utmost so that when you go you will have a lingering desire to come back again and stay where you will always be welcome. (Applause).

Mr. Hume: It has been a good many years since I have been in Miami, and going about over the town today, I see many changes. It is not the same town I knew eight or ten years ago. Generally, the Board of Trade has a good deal to do with it, and I can understand, now, part of the reason for the wonderful growth of Miami.

Response to Address of Welcome

Prof. W. F. Blackman

Mr. Hume: Sometimes we have to pick a man up without notice, and without warning, giving him no chance to prepare himself, and tonight we going to do that. We are going to ask Mr. Blackman, President of Rollins College, to make the reply to the address of welcome. He did not know anything about it until about ten minutes ago. He has not had a moment's preparation.

Mr. President, Ladies and Gentlemen:

It is a good deal worse than that. During those ten minutes my ears and my heart have been assaulted by those boys with their charming songs, and I have been entranced by my friend, Dr. MacGonigle, so that in those ten minutes I have not had a chance to think for a single second. Why did you not make the speech yourself, Mr. President, or why did not you get Mr. Skinner, or Mr. Hart, or Mr. Hubbard, or someone of those men who have for twenty-five years been doing things for the Florida Horticultural Society? I think you should have done so. There is this felicity, however, in the situation; in a sense, I appertain to Miami, and I am at the same time a member of the Florida Horticultural Society and am to speak in their behalf. About a dozen years ago, I came to Miami, and having a bit of foresight, I perceived that Miami was going to become something. I at once negotiated for a bit of rock here and parted with some of my hard-earned dollars and have been, since that time, a property owner and grower of oranges and grapefruit in this place. I share very considerably in the enthusiasm and pride of Dr. MacGonigle in the town.

I might extend the boundaries of Miami still further, and say that Miami is bounded by the North pole and the South pole, the starry space, the Aurora Borealis, the Milky Way overhead, and by China beneath our feet. There is nothing in the heavens above nor in the earth below, except Miami. You will always note charming modesty in the people of Miami when speaking of their town, particularly in their newspaper articles (I have a brother here, engaged in the newspaper business), and this modesty is illustrated here tonight by Mr. MacGonigle. (Laughter.)

We are very glad to come here. Twenty-five years of life the Society has known and it is just twenty-five years since I first came to the State. Although I have not lived here all the time, unhappily, I have read the proceedings of this society every year, and with ever-increasing delight and profit.

We are very glad to come here, because the welcome here is so hearty and so warm. At the various meetings I have attended, I do not thihk that any place has prepared so hearty a welcome as you people of Miami. You are doing everything for us, using your automobiles and your launches, your houses and your hotels, your school boys and your school buildings to make us welcome.

There are two points that occur to me, as I stand upon my feet (nothing occurred to me before I stood upon those feet). I never come to Miami, and I never come toward Miami without reverent feelings in my heart, and thanksgivings upon my lips, for one of God's great prophets upon earth—Henry M. Flagler, who, for a little season, unable any longer, I believe, to see much of the good things which were brought about through him, isolated by defective vision and hearing, will still be with us. I feel that we ought to uncover our heads before him for what he has wrought, not only for the East Coast, but for the entire commonwealth and the whole country, and pray that the example he has set may be followed, and that others may emulate him and pour forth their wealth lavishly as he has done, for the betterment of the human race. (Applause).

I am also glad that we can express our appreciation for our meeting in this place tonight. How big it is! How clean it looks; how lovely outside and how well adapted inside to serve its purpose as a school building. I do not know of another high school building in Florida as big and as well adapted for high school purposes as this. You are taking us to your beautiful beach, where the Atlantic rolls its mighty waves, you are taking us to the Everglades, where countless acres are being made inhabitable, you are showing us your groves, your roads, your beautiful residences, but the best thing in Miami, in my opinion, is your school house and its boys and girls. Perhaps, though, I am biased on account of my occupation as a school man. It is remarkable that the people of this city which has grown so rapidly, who have necessarily been confronted with the urgency of things which had to be done to keep up with the procession—and a little ahead of it, as the people of Miami have done—have kept up so well with the problem of dealing with their youth. You have not only gone into the business of growing oranges and grapefruit—you are successfully raising boys and girls who, in the market, would bring the highest prices and would not need an organization like the Citrus Exchange to put them through, either. (Applause).

For all of these things, Dr. MacGonigle, to yourself and to the absent Mayor whose absence we deplore, in behalf of the Florida Horticultural Society, I extend thanks for the words of welcome you have given us and for the countless friendly deeds by which these words have been given point and emphasis and memorable meaning. (Applause).

President's Annual Address

Prof. H. Harold Hume

Members of the Florida State Horticultural Society, Ladies and Gentlemen:

With this annual meeting we have reached the quarter of a century mark in the existence of our society. As an association we have much to be thankful for, but primarily, perhaps, for our continued and uninterrupted existence and solid growth. It is a lamentable fact that associations organized on lines similar to ours and which might have served a useful purpose have too often lived a short life and full of trouble. We have lived long enough to see many of these started, to exist for a time and then disband. Few State Horticultural Societies have been so fortunate in this particular as has this one.

Why has this society existed? And upon what basis may it claim the right to further existence? Is it not because it has filled a real need in the horticultural life of the State? In other words, its existence has been founded on service, the only basis on which any individual or organization can base a rightful claim to life and opportunity. The handful of earnest horticultural workers who organized this society twenty-five years ago felt that by doing so they could help not only themselves, but others—and how well they filled their part is written in the development of every horticultural industry in the State. Many of these individuals were versed in the horticulture of other climates, others of them tried to secure from the available literature of their time the information necessary to bring success in their chosen field. But neither the information secured in other localities nor yet the knowledge gleaned from printed pages woud fit exactly into the conditions confronting them. Knowledge only could turn seeming failure into success and they had to look to each other and to their own experiments to solve their problems. They came together to talk over their difficulties, and to learn from each other. And from that day until now our society, represented by ever-increasing numbers, has met to discuss similar problems and difficulties. During all these years this society has been a clearing house for the horticultural knowledge of the State. It has served the people and our most valuable industry, that of horticulture in its many branches, by presenting in open discussion at its meetings and in its printed reports the knowledge upon which this industry subsists. It has filled a place in this State that has not been so ably filled by similar societies in other States except in isolated instances.

Now the problems confronting us to-

day, and which will arise in the future, are and will be just as difficult as those which troubled the members of this society in the past. The knowledge at our disposal is nearly as inadequate proportionately, because of the new problems which have arisen, as was the knowledge of twenty-five years ago when compared with the problems of that time. There is just as large a need for the work of this society to-day as there has been at any time since it was organized and if it does this work and serves the people of this State as well or better than it has served them in the past, then it has a right to exist. But if it does not or cannot do this, then it must and will go the way of similar bodies to which attention has just been called. But granting the truth of all that has been said, we must not forget that the development of this society, the carrying out of its policies and the energizing of its life activities represent an enormous amount of work on the part of some one, and as is usual in such cases, this work has at all times since its organization devolved upon the shoulders of a few. We are fortunate in this, that as the founders of this organization have laid aside their work, others have come forward to take their places. We honor those who have done this work in the past and large numbers of us cannot do better than emulate their example. But let this point be emphasized, that to achieve the maximum of good of which this society is capable a larger portion of the membership must take a deeper interest in the society and its work. They should be more active not only during our three or four days of meeting in each year, but each and every member should be an ad interim committee for the advancement of this horticultural society.

It is my opinion that if every member would give some earnest thought to the advancement of the work in which we are engaged and put that thought in workable shape that it would result in much good. Kindly criticism of the work done by those whom you from time to time place in charge of your affairs is welcome. I speak, not for myself, but for the other officials, that they have lived up to the trust you have placed in them. Suggestions which might prove helpful would be gladly received by them, but they are not entitled to nor have they merited the unkind and ungrateful things which have at rare intervals been said of them and their work.

One of the hardest things we have to do is the appointment of satisfactory standing committees. Frequently those who know most will say least and oftentimes the placing of a member on a standing committe is a signal for that member to remain at home. This makes it rather difficult to handle this work as it should be. Someone may say that members should be consulted in advance of their appointment, but we must presume that every member is ready to do his or her part. It may seem that our standing committees have little that is new to discuss from year to year, but let it be remembered that every operation touching our work will repay the very closest investigation.

If you cannot do more, attend every

meeting. We can point with pride to members whose record of attendance is well nigh perfect, who may be counted on to be at our annual sessions as regularly as the year and time of meeting comes. We need live members, live meetings, discussions, and these we can only secure by having a large portion of the membership in attendance, and every one ready to take an active part in each and every session.

There is nothing more important than a good attendance of members and running our minds back over the past years we are struck by the fact that those meetings most largely attended have been the best we have held.

But if unable to attend the meetings we may at least pay our dues regularly. There is no one of us who is not interested in the welfare and upbuilding of our State and we believe that there is no organization that is doing more in this direction than the Florida Horticultural Society, and when we pay one dollar per year for our membership we are helping a good cause. I wish I could induce every member to adopt the motto: "Once a member, always a member," and make up our minds to pay our dues whether we attend or not, and not follow the plan of paying our dues only when we attend meetings in places to which we wish to go. Our membership for this meeting is a very decided increase over the membership of a year ago. Why? Because our friends know what a good place Miami is to come to and what good things are in store for those who attend—few places can offer such attractions. But lest our good Miami friends may think too well of themselves and their city, let me venture the remark that if this society were to meet yeear after year at this place, our membership would fall off. What I want to impress upon our membership is that we want everyone to stay with us year after year, regardless of where we may hold our meetings, and in addition to use every effort to induce others to join us. We need an increased membership.

The finances of this society have always been more or less of a problem. That is not to be wondered at when we remember that we are supported by membership fees from members more or less irregular in numbers. At various times it has been necessary to ask for further assistance from our members, and this, as you know, has always been gladly given. But to put the society on a more solid footing, and to enable it to increase its sphere of usefulness, its annual income should be larger and more certain as to amount. To remedy this, the attempt to secure money from the State Legislature has been made at various times. Now, though these efforts have thus far resulted in failure, perhaps because they were not properly made, I believe they should be continued. In doing this, however, no bargain should be made which will not leave us untrammeled in our work, and we must not become involved in politics. Against this we must in the future as in the past sternly set our faces. The cause of the failure of many State organizations lies right here. Better to go on as we are, we have demonstrated that we can exist, than to sell our birth-

right of free and untrammeled speech and action. We must retain at all hazards the right of free existence.

For the welfare of our society, more than anything else, we need a general publicity campaign. We need to become known to and to come into touch with larger numbers of those engaged in horticultural work in our State. How can this be done? Every member should be an active publicity agent in season and out of season. Each and every one of us can reach someone else—tell them of our work; bring them into our membership. The press of the State should be enlisted in our work. Through it let everyone know there is a Florida State Horticultural Society. Have articles published from time to time covering the history of the society, the work it is doing, its aims, objects and purposes, extracts from our proceedings, anything, in short, of interest that will bring us more prominently before the public. We might even use advertising space in some papers to advantage. I believe that the details of such a publicity campaign could be worked out and that it would do more than anything else toward the upbuilding of our society. Can it be done? Can we put more power into the hands of our Secretary to carry it out? Is it worth considering? It is closely tied up with our financial problem, yet it is possible to do something.

I fear I have already taken more time than I should, but let me call attention to one matter.

It is the privilege of this society to cooperate with every good agency looking to the upbuilding of horticulture in Florida. It is a notorious fact that the Experiment Station of this State has been an excellent training school for workers who, when they have reached a place of great usefulness to us and to our interests, are taken away by other States who are more alive to their interests than we are to ours. During the past year we have lost two of the best men this State has ever trained—Professors Fawcett and Blair. True, other men have come to take their places, and we welcome them, but these men must become acquainted with our conditions and needs. It takes time to do this, and it is time waste for us. How long must this go on? Is it not time to do something to remedy this condition. We can at least raise our voice in protest—we can at least bring some pressure to bear that ampler funds may be provided for our Experiment Station workers.

In the foregoing remarks, I have simply hinted at a few lines along which we may work for the betterment of our society and the helping of our horticultural workers. May our next quarter of a century anniversary see much more accomplished. It falls upon us to do our full part.

The Relation of Handling to Decay of Florida Oranges in Transit and on the Market

H. J. Ramsey
DEPT. OF AGRICULTURE

Mr. Ramsey: Ladies and gentlemen, members of the Florida Horticultural Society, this is the first time that I have had the pleasure of attending a meeting of this Society, or of giving an address before it. I hope that you will find some things of interest in the discussion this afternoon, and I shall briefly try to outline some of the work the Department of Agriculture has been doing in the state for the last six years. This season will probably be the last season the Agricultural Department will carry on its work to prove the causes and remedies of decay in transit in Florida.

Mr. President, Ladies and Gentlemen:

The U. S. Department of Agriculture commenced the orange handling investigations in Florida some six years ago and have been carrying them on continuously since then up to and including the present season. At the time the work was started similar investigations were in progress in California. The results of the California work were conclusive and consistent and proved to the California citrus industry that handling was the big factor influencing keeping quality, and allow for decay on arrival and while being held for sale and distribution. Some growers thought much of the decay and the ill deserved reputation of the Florida orange was due in some measure to handling, and requested the Department of Agriculture to make an investigation of handling methods.

During the first two or three seasons the work was largely of a research nature and confined to but few localities. It was soon found that the same principles held true with the Florida orange relative to handling as with the California fruit. The work was increased greatly in scope the last two or three years from both an experimental and demonstrational standpoint, and efforts were made to cover the entire citrus district and to do as much demonstrational and missionary work as possible.

Investigations extending over six seasons and covering practically the entire citrus district have conclusively proven that almost without exception the decay occurring in transit and while holding on the market is due to rough and more or less careless handling at the time of picking and packing. This has not only been proven by our experimental, carefully

handled shipments, but also by the uniform, sound arrival of fruit from packing houses doing good, careful work. It has been fully demonstrated that fruit can be carefully picked and packed in a commercial way so that it will carry to the market in sound condition and hold up for a sufficiently long period to allow of its distribution and consumption.

These investigations were made possible only through the full and hearty co-operation of the citrus industry and the results were made of value by their *commercial application* to the handling of citrus fruits. In California the Department work had a marked and beneficial effect on the industry as the results were quickly and effectively applied to the commercial handling of all citrus fruits. The California Fruit Growers' Exchange and other co-operative agencies made it possible to reach the growers and the industry in general more quickly and effective ly. These organizations and the independent shippers applied the results to their business and constantly kept before the growers the importance of careful handling.

When the work was started in Florida there were but few if any purely co-operative associations and no large co-operative organizations, and the work was carried on largely with individuals in but few localities.

Three years ago there was formed the Florida Citrus Exchange, and through its support and co-operation we were enabled to get in closer touch with the whole industry. The Exchange as well as most independents appreciated the fact that soundness is one of the most valuable assets in marketing fruit. By working with such a large co-operative organization so closely in touch with the growers all over the state, we were enabled to disseminate the results of the work more widely. This is not discounting either, in the least, the splendid support and co-operation given the Department work by nearly all independent shippers, for as you all know, the work was carried on successfully in co-operation with both the Exchange and independent shippers.

The independents and buyers, knowing full well the desirability of putting the fruit on the market in sound condition, applied the results to their business and quite generally insisted on the most careful handling. This served to bring home that by more care in handling, the fruit could be put onto the Eastern market in good sound condition.

The same type of work was started in Florida during the session of 1906-'07 at the urgent request of the Florida citrus industry. Large percentages of decay were showing up in nearly all shipments and the Florida orange was saddled with a reputation for poor keeping quality. By years of experience the dealers had come to the conclusion that Florida oranges were poor keepers and therefore either refused to handle them or else bought them at a considerable discount to to the growers the necessity of careful handling and helped make the work effective.

I do not think that careless handling was practiced by the great majority of growers in the belief that handling did not influence the keeping quality, or that keeping quality did not determine to a

great extent the market prices. On the other hand, rough handling was due more to the fact that growers and packers had no conception of what careful handling meant. Poor work by pickers and packers even at the present day is not due entirely to a lack of appreciation of what it means as regards keeping quality and reputation, but largely to ignorance of what constitutes careful handling.

Great care, much time and money is expended in bringing an orchard into bearing and in the production of large quantities of fine fruit. It does not seem to be a good business policy to nullify the results, of all the time and money spent in growing the fruit, by careless handling in harvesting the crop. A little extra care and money put into the handling of the fruit in its preparation for the market means sound arrival and increased returns. Very often this extra care in handling and packing will bring sufficiently large returns to yield the grower a handsome profit, where otherwise his year's business would have shown a loss.

No one would have dreamed that such a great improvement, as has been made in handling, would have been possible in such a short time. Three or four years ago there was not a grading belt in the state, large hoppers holding several wagon loads of fruit were found in nearly every packing house, and in but few cases was the fruit accurately sized and graded and little care was exercised in picking, washing or packing. To-day nearly every packing house in the state handling any considerable quantity of fruit is equipped with modern machinery, grading belts, etc., and the large hopper is decidedly out of fashion. Quite a number of packing houses are now equipped with every modern convenience and device for carefully and economically handling the fruit. The fact that Florida is now almost on a par with California, makes the improvement which has been made seem even greater than that made in California, as the Florida industry had a much longer road to travel, and the change had to be more radical. Florida to-day has many packing houses on a par with any in California, and in many cases it is abreast with it in methods of picking and packing.

The people of Florida have reason to be proud of the great changes which have been wrought and the wonderful improvement made. There is, however, much to be done in order that Florida may maintain the reputation which it has built up for itself. More improvements must be made, there can be no let down in the standard of work and the necessity for careful handling must all the time be kept before the growers in order that the weaker links may be strengthened, and that Florida may continue to maintain a reputation for sound fruit.

The results of the six seasons' work have been consistent and striking throughout. During the last three seasons the work has been extended to nearly every shipping point in the state, and no effort has been spared to acquaint each and every grower with the results of this work, and the necessity of care in handling both in the field and packing house.

We feel that it is now up to the industry to put into effect the results of the

work as the cause of decay is generally known and the methods of handling to avoid losses from decay has been most fully demonstrated. This has been done through actual work at a great number of packing houses, and by a series of meetings at various points where meetings were requested or sufficient interest was shown to warrant holding them. This season therefore will probably be the last that the Department of Agriculture will carry on the citrus handling investigations in Florida.

In connection with the work which has been done, it may be well to mention that we have in no way tried to do police duty nor have we gone into groves or packing houses with any intention of criticizing the work there done, nor to check up foremen or managers. Our only excuse for dong the work was the good that might be accomplished, and we have been actuated by no other motive. Picking foremen and packing house managers have sometimes felt that we were there to check them up and to find fault. We wish to make it clear that we were there for no such purpose, but simply to bring home to the greatest possible number the results to be gained by more care in handling. In the majority of cases foremen and packing house managers have been able to strengthen themselves with their associations, to improve greatly the quality of work, and bring greater results to their associations by taking advantage of the results of our inspections and experiments.

The cause of decay in transit is an old story with most of you, but in order to more clearly bring out the results of our experiments, it may be well to refer to it briefly. The decay of citrus fruit which occurs in transit and on the market is in most cases due to the blue mold fungus. This fungus is a plant of a low order and requires certain moisture and temperature conditions for its development and growth. Laboratory and field experiments have shown conclusively that the blue mold fungus has not the power to penetrate the sound, unbroken skin of the orange. Blue mold, therefore, can cause decay only after the orange has been injured in some way. These injuries are made in picking by thorn or nail punctures, stem punctures, clipper cuts, by dropping, or by rough handling in picking, hauling and packing. It is most fortunate, therefore, that this decay is dependent upon injuries as it can be cut down to almost nothing by reasonable care in handling.

Weather conditions influence decay to a greater or less extent. During very dry weather a clipper cut or other injury may dry up or heal over so quickly that the blue mold spores do not germinate, and during such times such injuries are apparently not so serious. However, after the fruit has been packed tightly into a box, there is more or less condensation of moisture on the surface of the fruit and the spores may then germinate and start decay that will show up after its arrival on the market.

During times when the humidity is high and rainy weather makes thorough drying difficult, every injury offers a chance for the germination of the blue mold spores and the development of decay. The greatest care in handling is nec-

essary during such periods in order that the fruit may be put on the markets in sound condition.

Low temperatures at time of packing and while shipments are in transit will often delay the development of decay only to have it occur as soon as the fruit is placed under warmer conditions. Many of our shipments this past season showed no decay on arrival but developed very high percentages of decay during the market holding period. Very low temperatures prevailed for a long time during the past shipping season and they were too low for rapid growth and development of the fungus during transit, but under warmer market holding conditions, the decay developed rapidly in all injured fruit.

Some decay occurs in the Northern markets which cannot be entirely eliminated by careful handling as it is caused by the stem-end-rot fungus. The original infection occurs in the groves and it is impossible to grade out the infected fruit at the time of packing. Very little of this decay shows up on arrival, but if the fruit is held at market under warm conditions, much stem-end-rot may develop during a two or three weeks holding period. In the season of 1910-'11 considerable stem-end decay developed on the market in shipments from nearly every section of the state. There was little or no difference found between carefully or commercially handled lots. During the season of 1911-'12 there was hardly any stem end rot from any section of the state and what did occur was found mostly in the fruit commercially handled. In but few cases was there enough of this decay to attract any attention at the market end or to detract from the value of the fruit. Experimental shipments from groves showing high percentages of stem-end decay during the season of 1910-'11 showed little or no decay from this cause during the past season.

The data relating to the occurrence of decay in transit and on the market given in the discussions to follow have reference only to blue mold decay.

The investigations during the last two seasons have been carried on mainly along three lines, as follows:

1. Picking and Field Handling: The work under this head included inspections of the picking and field work with a view of determining the actual amount of injury made in the field throughout the state. Along with this there was carried on more or less missionary work with pickers and foremen in order to make clear to them what careful work meant and the relation of injuries to decay.

2. Washing Experiments: A series of holding tests of washed and unwashed fruit were put up in various packing houses to determine the relation of washing to the keeping quality of oranges.

3. Shipping Experiments: These experiments consisted of a series of shippings and market holding tests to determine the relation of handling to the occurrence of decay in transit and on the market. These experiments were made not only to get data as to the relation of different methods of handling to the occurrence of delay, but also to demonstrate to growers and packers what could actually be accomplished by more care in handling.

PICKING

During the season of 1910 and 11 and 1911-12, inspections were made of a great number of picking crews to ascertain the actual amount of injury being done in picking. The tables show only clipper cuts, long stems, and to some extent other visible abrasions or bruises, as there is no way of actually tabulating the amount of injury caused by dropping and other rough handling. The kind of work shown by the tabulation of clipper cuts, long stems, etc., give a fair indication of the character of the handling throughout.

A picker who is careless enough in his work to leave a large number of long stems, or to make a high percentage of clipper cuts usually is equally careless in other respects. If a picker does good work in avoiding clipper cuts and long stems, he can in most cases be depended upon to be careful in putting the fruit into the picking sack or basket and in placing it into the field box.

These inspections and the field work in connection with the shipping experiments conclusively showed that injury was not caused alone by clipper cuts or by leaving long stems; but in numerous other ways, and that it is necessary to exercise the utmost care throughout the whole process of handling from the tree to the car. Injury may be done by placing the ladder carelessly against the tree so as to cause bruising of the fruit against limbs or cause it to be scratched by thorns. The picker may again puncture or scratch the skin of the orange by bringing it in contact with thorns or cut it with his fingernails. The fruit may be cut by the clippers as the picker is bringing the clipper in position to sever the fruit from the tree, or it may be done at the time when the stem is cut. Again, the stem may be cut long or jagged and sharp so that other fruits are injured by it. A long stem is worse than a clipper cut because during the journey of the fruit from the tree to the packing box there are numerous chances for a long-stem orange to injure other fruit. This fault in picking is by far the most common and at the same time the most serious.

A good deal of injury is caused where large sacks are used for picking, in bruising of the fruit in the sack between the ladder and the picker's body. Where open-mouthed baskets are used, fruit is often bruised by dropping from a considerable height into the basket and again in pouring it into the field boxes. Some pickers are expert in picking the fruit with one hand and with a dexterous twist have the fruit fall into a basket several feet below. Mr. Tenny's experiments showed that often times as high as 80 per cent decay resulted from dropping sound fruit 18 inches on to a hard surface, while 20 per cent decay was about the average. This shows the great importance of placing the fruit carefully into the picking sacks or baskets and into the field boxes.

Considerable injury is caused by putting fruit into boxes containing twigs and gravel or into boxes badly splintered and having nails projecting on the inside, by rough loading, by putting too much fruit into the boxes so that the boxes placed on top of them will rest on the fruit and not the boxes below, by hauling the fruit in

on springless wagons and by having the driver sit on the fruit instead of on a specially provided seat.

In all of our picking, we nearly always practiced the double cut, that is, we cut the stem long the first time, and as we brought the orange toward us, we made the second and last cut, where we could see just what we were doing. If this method is followed there is absolutely no excuse for making clipper cuts or leaving long stems. Besides, the orange is then in a position where it can be quickly and carefully placed in the picking sack. This method takes a little longer at first and more concentration on one's work, but a picker can soon get so that he can pick nearly as much this way as in the old way.

We prefer to use a canvas bag, holding approximately half a field box of fruit This bag is open at both ends and is folded over and up from the bottom and attached by straps and snaps to rings on some portion of the bag above. The top of the bag is more or less closed so as to make it impossible to drop the fruit into the bag. When the sack is full the whole can be placed into the picking box, the snaps unfastened from the rings, and by catching hold of the top, the fruit can be left in the box by slowly pulling away the canvas. Good work can be done with open-mouthed baskets, but there is much temptation to let the fruit drop into them and to pour the fruit carelessly into the boxes. We also use gloves, usually canvas, so as to avoid cutting the fruit with fingernails.

Fifty-seven inspections of the work of 46 picking crews during the season of 1910-11 showed an average of 4.2% clipper cuts and 13.0 long stems. This is a fair indication of the average character of work which was being done in the state. The crews working by the box had 4.3% clipper cuts and 14% long stems. The crews working by the day had 3.7% clipper cuts and 9.6% long stems. The day paid crews were, as you would expect, doing the best work, but the difference is hardly as great as it should be. There was a great variation in the character of work being done by the different crews. The best crew had but 1% clipper cuts and .6% long stems, while one

Table I.

THREE INSPECTIONS OF ONE PICKING CREW, SHOWING GREAT IMPROVEMENT

Picker No.	Jan. 14 Clipper Cuts Per Cent	Jan. 14 Long Stems Per Cent	Jan. 20 Clipper Cuts Per Cent	Jan. 20 Long Stems Per Cent	Mar. 4 Clipper Cuts Per Cent	Mar. 4 Long Stems Per Cent
1	5.2	3.6	0.0	5.4	1.1	0.5
2	1.1	6.1	0.0	3.6	0.5	0.5
3	9.5	4.1	1.0	9.2	0.5	2.0
4	1.1	15.4	4.8	4.8	6.4	2.8
5			1.0	4.5	0.6	0.6
6			0.6	3.5	1.2	1.8
7			0.6	3.4	0.5	0.5
Crew Average	5.4	9.9	0.9	5.1	1.0	0.6

of the worst had 11.2% clipper cuts and 23.0% long stems. One crew was improperly picking but 1.6% of the fruit it picked, while the other was improperly picking 34.3%.

This illustrates one point we want to bring out and that is this: It does not depend so much on whether the crew is working by the day or box, as it does upon the foreman. The kind of work you get depends upon the foreman, or in other words, "the man behind the gun." If he insists on getting the proper kind of work, he is likely to get it, and on the other hand, if he is disinterested and exercises little or no supervision, his crew will do at best only indifferent work:

That improvement can be made, if the foreman insists on it, and knows something about handling men, is shown in table No. 1. The first inspection, January 14, showed 5.4% clipper cuts and 9.9% long stems. The second, January 20, 0.9% clipper cuts and 5.1% long stems. The third, March 4, 1.0% clipper cuts and 0.6% long stems. It is interesting to note that this is a box paid crew and that this great improvement was brought about in spite of this handicap.

During the season of 1911-12 an average of the day picking showed 1.5% clipper cuts and 15.7% long stems, while the box picking showed 4.0% clipper cuts and 18.1% long stems. The colored crews did on the whole a little poorer work than the white crews. Crews where the foreman was picking, were picking about 28% improperly as against 15% for the crews where the foreman was not picking. The comparison of crews, with foreman picking and not picking is very striking and suggestive. A foreman should do no picking as he has his hands full looking after his crew. It should be his duty to see that the clippers are in good order, to see that field boxes are fit to put fruit into, and to exercise supervision over the crew, putting a premium on quality rather than quantity. He could easily go over one or two boxes of each man's fruit once or twice a day to ascertain what kind of picking each man is doing. If a picker's work is faulty, he should call his attention to it and work with him to bring about improvement. Where a foreman does picking he can not exercise the proper supervision over the work of his men.

During the past season, an average of all inspections showed 3.4% clipper cuts and 17% long stems—a reduction in clipper cuts but an increase in long stems. The five best crews had 0.5% clipper cuts and had but 6.5% long stems, while the worst five had 8.3% clipper cuts and 31% long stems. While there has been a great improvement in the equipping of packing houses during the last year, there has not been a corresponding improvement in field handling. Much stress has been laid on picking and field handling, *as good field handling* is the very *foundation* of *good keeping quality*. It is the injury done in picking that is responsible to a great extent for decay in transit and on the market, and this injury cannot be eliminated and its ill effects counteracted by good packing house equipment. Field handling must be much improved before we can hope for a material reduction of decay in the average commercial pack going out of Florida. Co-operative associations find

it to their advantage to have the picking done by an association crew. This gives uniformity at least as regards the quality of the work and the manager can be held responsible for the handling throughout. Where each grower picks his own fruit there is bound to be a great difference in the kind of picking done by the various growers and the ones doing good work suffer because of the poor work of their neighbors. Where the picking is done by an association crew, all growers' fruit is on the same footing as regards handling and if the manager is the right kind of man, he will see that he gets good picking. He must have good field handling to enable him to put the association fruit on the market in sound condition throughout the season. The necessity for careful picking and field handling is quite generally recognized, but the difficulty comes in getting the right kind of foremen. A foreman must know not only what good work is, but what it means to his employer. If he takes pride in his work and has the interest of his employer at heart, he has qualifications which recommend him for such a position of trust, and it is a position of trust and responsibility, as a picking foreman can either make or lose money for the growers by the character of work performed.

In the past, premium has been put on quantity and not quality, and a man who has been picking oranges for thirty years is often the poorest picker and the hardest one to convert; in fact it is sometimes impossible to convert him. Nearly all picking up to recently has been done by the box and every inducement offered for careless work. If the pickers find that no premium will be put on quantity without quality, and that quality stands first, it may be that it will be easier to get good picking. If the industry, as a whole, will insist on getting good work, without doubt the picking and field handling will be greatly improved.

WASHING EXPERIMENTS AND PACKING HOUSE EQUIPMENT

A series of washing experiments were made during the season of 1910-'11 to get at the effect of washing on the keeping quality of oranges. Each experiment usually consisted of eight boxes of fruit, four of which were picked and carefully handled by ourselves, while four were of a commercial pick of the same day and from the same grove. Two boxes each of the carefully and commercially handled lots were put up without washing and the two remaining in each lot were run through whatever machine was being used in the packing house. These different lots were packed up and held in the packing house for two weeks, after which they were opened and the percentage of decay determined by examination of every orange in each box.

Table No. 2

ORANGE WASHING EXPERIMENT
SEASON 1910-1911

Carefully picked and packed, not washed....	1.0%
Carefully picked and packed, washed.....	4.1%
Commercial pick and pack, not washed.....	3.6%
Commercial pick and pack, washed.....	10.2%

There were in all 37 experiments in 32 different packing houses and 13 types of washers used. In the carefully handled lots, the fruit not washed showed 1

% decay as against 4.1 % for the same fruit washed. In the commercially handled lots the fruit not washed had 3.6% while the same fruit washed had 10.2% In the carefully handled lots washing increased the decay 3.1%, and in the commercially handled 6.6%.

These results unquestionably show that washing as usually practiced very materially increases the decay. We do not advocate the doing away with the practice of washing entirely as there is much fruit in the state requiring washing in order that it may be put on the market in an attractive and salable condition. Where fruit is free from sooty mold and reasonably clean, it would be advisable not to wash it and to only wash fruit, covered with fungus following the whitefly, or so dirty as to require cleaning. Wherever fruit is clean there is nothing to be gained in washing it.

It was found that much of the decay caused by washing resulted from the use of poor types of washers, or by allowing washers to get out of repair, or twigs and gravel to accumulte in them, and by lack of care in running them. Considerable decay follows the use of dirty water in the soaking tank and failure to properly dry the fruit or poor drying after the fruit is washed.

There was sometimes as much difference between the way two washers of the same types were operated as there was between different types of washers. The kind of cleaning which one gets and the amount of injury done in washing depends to a great extent upon the man who is running the washing machine. We cannot very well recommend any particular make of washer, but in a general way, we can indicate some of the points to be kept in mind regarding washers. From the stand-point of careful handling, a washer is preferable where the fruit is in sight all the time and where there is no pressure to bear down on top of the fruit. In the enclosed types one loses sight of the fruit while it is going through the washers and anything that gets out of order in them may do an immense amount of injury before it is discovered. Twigs, gravel, etc., may collect at certain points in them and injure a great amount of the fruits going through the washers. The *first requisite* to *careful washing* is to *bring* the *fruit* into the *packing house* and to the *washer* in *sound, uninjured condition.* The more injury there has been done in the field, the more will be the decay resulting from the washing operations. The water in the soaking tank should be kept clean and changed at least once or twice a day. The question is often asked whether any chemical can be put into the wash-water to kill the blue mold spores in it or on the fruit. Considerable work has been done along this line and nothing has been found that can be put into the water which will kill the blue mold spores and not injure the fruit. The only thing to do is to keep the fruit free from injuries.

Table No. 3

Orange Washing Experiment

COMPARISON OF HOUSES IN SAME LOCALITY

		House No. 1 Per Cent	House No. 2 Per Cent
Carefully Handled	Not Washed	1.1	0.2
	Washed	14.1	0.2
Commercially Handled	Not Washed	4.7	1.2
	Washed	39.5	1.3

Table No. 3 gives a comparison of two experiments in two houses in the same locality and shows that washing can be done with little or no injury to the fruit. House No. 2 was doing exceptionally good work both in the field and packing house and there was practically no difference between the carefully and commercially handled lots nor between the washed and not washed. House No. 1 was doing very poor work both in the field and packing house. The decay in the carefully handled not washed lots in each house indicates that the fruit was essentially of the same character. The great increase in decay in the washed lots in house No. 1 was due to the fact that the fruit was carelessly run through an antique type of washer and little effort was made to dry the fruit; as for the most part, it was stacked up in the packing house in field boxes after running over a small indoor rack. At the time when the experiments were made in this house, much decay was showing up on the market in the fruit which was being shipped from it, and in some cases, the growers had to pay the freight on the shipments. House No. 2 had modern equipment throughout and was doing thorough drying. The comparison of the results in these two houses is very striking and significant. In one case the growers were actually losing money on their citrus business, while in the other the growers were making a good profit on their investment. This difference was not due to any great difference in the quality of the fruit or to methods of growing, but was due entirely to the type of handling being given the fruit in the two places.

Thorough drying is essential to good keeping quality and under average weather conditions, the artificial driers now in use are doing very good work. None of them, however, do perfect work during periods of rainy weather and high humidity, but on the whole are much preferable to out-door drying racks as they do away with the necessity of so much elevation and dropping.

A packing house should be arranged and so equipped as to carry the fruit on a level from the washer to the sizer. The aim should not be to get in a great amount of machinery, but to do away with every possible angle, elevation and drop, and to eliminate every source of injury.

Decayed fruit should not be left around in boxes or allowed to accumulate on the floor and under the packing bins. Where rotted fruit is allowed to remain in the

house, any little breeze or disturbance will scatter great quantities of the spores of the blue mold fungus over all of the fruit in the house. A clean, well-lighted packing house is not only an incentive for better work, but makes the fruit less liable to decay by lessening the chances for infection. A clean packing house is a good indication that genuine efforts are being made to do good work all along the line, as the cleanliness or filthiness of a packing house is a good criterion of the kind of handling an association is doing.

SHIPPING EXPERIMENTS

A series of experimental shipments were made to determine the relation of field and packing house handling to decay in transit and on the market. Each shipment consisted of six boxes, two very carefully picked and packed by the Department men, two commercially picked but carefully packed, and two handled in the ordinary commercial manner. The fruit in each experiment came from the same grove, was picked and packed at the same time and shipped out in the same car. These lots were then expressed from whatever city in the north where the car was sold, to Washington, D. C. The fruit was then carefully examined, orange by orange, on its arrival at Washington and at intervals of one, two and three weeks after arrival. We tried to secure comparable conditions for all lots in each experiment in everything but the type of handling.

At the time this fruit was picked and packed, an equal amount of fruit of the same pick in each lot was set aside in the packing house, loose in field boxes, and was packed up three or four days later and sent out as a delayed shipment. This was done in order to clear up the much discussed question of delaying or curing the fruit in the packing house before shipment.

During the season of 1910-'11 there were sent out 79 shipments from more than 40 packing houses, covering the entire shipping season. The results were most striking and consistent and proved conclusively that handling is the one big factor in determining the keeping quality. An average of the 79 shipments shows 7% decay on arrival in the commercially handled fruit as against only .6% in the same fruit carefully handled. At the end of a three weeks' holding period on the market, the commercially handled fruit showed 14.2% and the carefully handled but 1.9%.

Table No. 4

FLORIDA ORANGE SHIPPING EXPERIMENTS

SEASON OF 1910-11—AVERAGE OF 79 SHIPMENTS—PER CENT OF BLUE MOLD DECAY

	On Arrival Per Cent	1 Week Later Per Cent	2 Weeks Later Per Cent	3 Weeks Later Per Cent
Careful Pick and Pack.....	0.6	1.1	1.6	1.9
Commercial Pick and Pack.....	7.0	10.8	13.2	14.2

Table No. 5

Florida Orange Shipping Experiments

SEASON 1911-12—65 SHIPMENTS FROM 37 HOUSES—PER CENT BLUE MOLD DECAY

	On Arrival Per Cent	1 Week Later Per Cent	2 Weeks Later Per Cent	3 Weeks Later Per Cent
Careful Pick and Pack.....	0.6	0.9	1.4	2.2
Commercial Pick and Pack.....	4.0	6.8	10.4	14.2

During the season of 1911-'12, 65 shipments were made from 37 houses and corroborated fully the results of the previous season's work. The commercially handled fruit had 4% decay on arrival and 14.2% at the end of three weeks. The carefully handled had .6% on arrival, the same as the season before, and only 2.2% at the end of three weeks. There was a decrease of 3% in decay on arrival in the commercial handling for the season of 1911-12, while the carefully handled fruit showed the same decay as during 1910-11. The decay in the commercially handled fruit went up 14.2% during the holding period and equaled that of the previous season.

Referring back to the table No. 4 We find that there is a difference of over 6% in decay between the commercially and carefully handled fruit on arrival. 6% of 4,000,000 boxes is 240,000 boxes of fruit rotted and decayed before it even reached the market and which could have been saved by more care in handling. The grower paid freight, packing and selling charges on all of this decayed fruit, but realized nothing from growing it or to pay interest on his orchard investment. The actual money loss on this amount of decayed fruit would easily reach $500,000.00, to say nothing about the ill effect on the reputation of Florida fruit and the depreciation in value of the fruit actually arriving in sound condition. The loss in actual decay can be figured in dollars and cents, but there is no way to capitalize reputation.

As you all know, it is not only important and sufficient that the fruit arrive in sound condition, but also that it hold up for a period of two or more weeks to allow for its distribution and consumption. The consumer prefers to buy fruit that will hold in reasonably sound condition for some time, and the dealer naturally wants to supply his customers with what they want and is willing to pay high premiums for fruit on which he can depend to arrive and hold in sound condition. This illustrates to some extent the importance of building up and sustaining a reputation for good, sound, fruit, honestly and attractively put up.

Our experiments show conclusively that it is possible to so handle Florida citrus fruits that they can be put on the market in practically sound condition and can be held two or three weeks after arrival without any material increase in decay. This is illustrated by reference to the tables showing the decay in shipments during the past two seasons. At the end of three weeks' holding period in 1910-11 the decay had increased from

7% to 14.2% in the commercially handled lots, while in the carefuly handled, the decayed from .6% to only 1.9%. The 1911-12 results showed 14.2% for the commercially handled and only 2.2% for the carefully handled at the end of the market holding period. If further proof is necessary to demonstrate that fruit can be put on the market in sound condition, one has only to observe the results being obtained commercially by packing houses doing good work. A table is here shown giving comparisons of commercial shipments from packing houses dong good and poor work, and the results of such comparisons are striking enough, it would appear, to convince the most skeptical.

Table No. 6

COMPARISON COMMERCIAL SHIPMENTS 1910-11

FROM FIVE PACKING HOUSES DOING CAREFUL WORK AND FIVE PACKING HOUSES DOING CARELESS WORK

PER CENT. BLUE MOLD DECAY

		On Arrival	1 Week Later	2 Weeks Later	3 Weeks Later
5	Careful	1.4%	3.1%	4.1%	4.5%
5	Careless	17.6	27.9	34.0	37.1

Many growers and packers advocate the holding and curing of oranges in field boxes in the packing house for three or more days to allow the fruit to wilt. The claim is made that fruit will pack more easily, that a greater number of culls can be thrown out, and that considerable decay can be eliminated before packing.

Table No. 7

IMMEDIATE VS. DELAYED SHIPMENTS

AVERAGE 56 SHIPMENTS FROM 28 HOUSES

SEASON 1911-12

PER CENT BLUE MOLD DECAY

	On Arrival	1 Week Later	2 Wks. Later	3 Wks. Later
Commercial handling delayed	5.8	8.7	11.7	15.1
Commercial handling immediate	2.9	5.7	9.7	13.5
Careful handling delayed	0.7	7.0	1.5	2.0
Careful handling immediate	0.5	0.9	1.4	2.3

A comparison of 56 shipments from 28 packing houses this past season, shows that delaying fruit in the packing house for three or four days before packing greatly increases the decay shown in the commercial shipments.

The more injury there has been made in handling, the more serious and disastrous is the practice of so-called curing. When fruit is carefully handled and uninjured, a delay of two or three days does not seem to make any material difference as to decay. Under ordinary commercial conditions, it is decidedly unwise to hold the fruit in the packing house for any length of time. The fruit is just that much older and that much nearer its life limit when it reaches the consumer. In our investigations we have found nothing to justify the practice of delaying or curing, and the best results are obtained where fruit is packed and shipped out as soon as possible after picking.

Enough experimental work has been done to make the results conclusive. No effort has been spared to make the results available to the industry, by dem-

onstrations and meetings, and we feel that the Department has done everything that can be reasonably expected of it. A bulletin will soon be issued covering fully all the phases of the handling work during the past six years and we hope to have this ready for distribution by the beginning of the next citrus shipping season.

The principles and necessity of careful handling are pretty generally known and recognized, and what is now needed are the right kind of men, for foremen and managers, men who appreciate what careful handling is and means, and who will not tolerate careless, slovenly work.

Results and reports of the Department's earlier work along this line in Florida is to be found in the annual reports of this Society for the years 1907 to 1910 inclusive. The results of the field work during the season of 1910-'11 and 1911-'12, have been given to some extent in this paper.

This work forms a part of the activities of the Office of Field Investigations in Pomology, under the direction of A. V. Stubenrauch, expert in charge. The following members of the staff were associated in the field work in Florida during the seasons 1910-'11 and 1911-'12: H. J. Ramsey, A. W. McKay, B. B Pratt, C. S. Pomeroy, K. B. Lewis, G. M. Darrow and J. F. Fernald.

Mr. Burton: I would like to ask Mr. Ramsey if it is the purpose of the department to have this service continued next winter in this state.

Mr. Ramsey: No, we do not expect to do any work in the state next winter; at least, that has been the decree by the ones who have it in hand.

Mr. Burton: I think that the growers of Florida ought to adopt the suggestions of Mr. Ramsey. I do not know of any work that has been done in this state that has contributed so largely to the citrus industry as the work the department has done. I believe that this Society ought to pass a resolution expressing their thanks, and that they should put it up to the department at Washington and urge that this work be continued, because it has hardly begun. There are a few packing houses that are equipped for handling the fruit properly. The growers themselves have to be shown how to equip their houses right; they have to be shown how to operate them. There is not a grower here who is not in position to appreciate Mr. Ramsey's talk. I believe it would be nothing short of a calamity if we do not have these gentlemen in this state, not only next winter, but for a series of years, as the work is just beginning to gain headway. We need these men and their ideas in every community in this state. Even in this community, I think they will tell you that Mr. Ramsey's suggestions have been worth thousands and thousands of dollars. I could name scores of communities where they feel just that way about it. Therefore, I move that a resolution of thanks be extended to Mr. Ramsey and his coworkers, and that the department be requested to allow their work to continue.

Mr. Hart: I take great pleasure in seconding Mr. Burton's motion.

(Motion carried.)

The Influence of Unripe Fruit on the Citrus Fruit Market

R. P. Burton
FLORIDA CITRUS EXCHANGE

Mr. President, Ladies and Gentlemen:

I was requested to prepare a paper on the influence of unripe fruit on the citrus fruit market. I prepared that paper, but reading a paper is rather a bore to me. However, I am going to read a part of it, and part I will let go.

My friends, you grow oranges for consumption; you do not grow them for the purpose of paying freight to steamship and railroad lines. You grow them for the profit you can get out of them. To make this profit you have to get somebody to eat those oranges, and when you put a check on consumption, you put a check on the selling process, which reacts directly on yourselves When you start the market going downward you can't stop it until you prove that you have something good to eat

The discussion of this subject is necessarily a discussion of cause and effect, as there is no effect without a cause. There is no subject in the minds of the citrus growers of Florida to-day so vital to the growers as the influence of immature citrus fruits in the markets of the country, as it affects directly the income of every citrus grower, not only in Florida, but in California.

The growing of citrus fruits is one of the most fascinating. If properly grown and marketed, there is no other fruit grown in this country that pays more handsomely, and the owning and handling of a citrus grove, aside from its intrinsic value, is one that appeals to the fancy. In considering the influence of immature fruit on the citrus market, we must take into account the fact that we are all human and are actuated primarily by the same instincts. If we will bring the matter home to ourselves, consult our wives and families, we will find that any class of fruits or vegetables is bought and placed before the family for consumption with one idea alone in view; that of presenting something that is not only pleasant to the eye, but palatable and wholesome. A well matured, highly colored, bright Florida orange is very inviting to the eye, and, when eaten, very delicious to the palate. When once eaten, a desire is created for another. If they are kept continuously before the people who buy oranges and eat them, they will be recommended to others by those who do eat, and they become an advertisement of

themselves for themselves. On the contrary, a green, unsightly, sour Florida orange is repulsive to the eye, repelling rather than attracting purchasers. It is generally known in a large section of the United States that a large part of the Florida crop of citrus fruits are russets. Prior to the New Year there is a universal demand for bright Florida oranges; russets and goldens are not desired. The brights are sold for the reason that they look good to eat; the russets and goldens are not desired because they do not look to be good to eat.

Prior to the great freeze of 1894, Florida made her reputation for the quality of her fruits. There was very little of this fruit shipped out of the Sate that had not reached a sufficient state of maturity to appeal not only to the eye, but to the palate. There had been built up in this country a widespread and universal demand for Florida oranges. Grapefruit had not become a factor. The freeze of February, 1895, practically wiped out the citrus industry in this State. There was a gradual increase of the output from year to year, but the factors that had been engaged in marketing prior to this freeze for lack of business, had either left the State or engaged in other enterprises. A new set came into prominence with the growth of the industry, having at their hands, ready made, an insistent demand for Florida oranges, which was many times in excess of the supply. Much of this demand was from territory that was not discriminating as to quality or maturity. They wanted a few oranges for Christmas and earlier. This demand was taken care of largely by small shipments through the express company, many of its agents operating as the distributors. The limited quantity of fruit could be taken care of in this way, and no serious harm was done, as there was nothing to follow to feel the ill effects. As the output increased in volume and these small markets were supplied, other markets had to be found. Many of these had forgotten about Florida oranges and when they began to buy, an effort was made to ship it all out of the State before the first of January, resulting in shipments of immature fruits to most markets, a large number of which would buy but once, and the opinion became prevalent that Florida could grow good oranges no more. For a number of years in the territory west of Pittsburg, dealers had arrived at the conclusion, and so expressed themselves, that Florida oranges were no longer worth handling; that Florida could not produce a good orange as she formerly did. The shipments of green immature oranges out of this State had been carried to such an extent that this became a fixed idea, not only in the minds of the dealers, but of the consumers. The few cars that were bought by the wholesalers were for the purpose of filling in between California Valencias and Navels. The statement was frequently made by these wholesale fruit dealers that after they had distributed a few cars of Florida oranges, the demand was dead, and they would shift from them to Californias, Jamaicas or Porto Ricos; that while Californias might not be any sweeter, they did have a better appearance, were seedless, and they were not the despised Floridas. Prior to the past season, it was customary for han-

dlers of Florida oranges operating in this State to begin to move in many instances before the oranges were fully grown. A few early shipments would sell for fair prices, but as soon as the movement began in earnest the market would collapse and would remain in that condition until late in the season. The growers themselves were not responsible for that condition, as the people who were doing this shipping were either buying on their own account or handling on account for the growers. If bought, the grower who sold felt that having sold the fruit and received the money, he had no right to say to the shipper that he should wait until the fruit was mature. The purchaser felt that it was his right to send this fruit to market early enough to anticipate the decline which would wipe out his profit and probably result in a loss. Those who were handling for the account of the grower were not interested beyond the price per box that they received for their services. Much of it was handled at a fixed price per box regardless of what it netted the grower; hence they were interested in beginning as early as possible; shipping as fast as possible and moving as much as possible, as the volume moved governed the net amount of their income for the season's business. In private conversation with a number of the most intelligent of these operators, they admitted that it was wrong, that the shipping of this green stuff killed the market, but took the position that if they did not ship it, somebody else would, and they were in the deal for all they could get out of it. I have studied this question closely, both in California and in Florida, as well as in the market. I have seen promising markets go to pieces when the volume of fruit offered was not excessive, but I never saw it go to pieces under a normal supply unless there was some inherent defect in the fruit. California navels often cross the continent, encountering extremely low temperatures in transit, are frozen en route and when they finally reach destination are thawed out and become bitter. The most disastrous season that I ever saw in California fruits was the season of 1903 and 1904, one of the severest winters on record, when practically everything that reached the Eastern markets for six weeks had been seriously damaged by cold in transit. Prices were disastrous. When this period passed, a large volume of good fruit, well matured and in perfect condition and sizes, was sold at about the same prices that the damaged fruit sold for before the consumers were convinced that they were good. When confidence had again been established, it seemed to be practically impossible to overstock these markets. Knowing these things to be true, the management of the Florida Citrus Exchange in its first season's business placed itself squarely against the movement of immature fruits, as there was no other way to rehabilitate the market for Florida oranges and place them where they should stand, in the lead of all others in this country. The growers themselves, in the main, had come to learn the effect of putting this green, immature stuff on the market, and they are not to be held responsible for the shipments that were made by brokers and speculators. Growers who were buyers and shippers prior

to the organization of the Exchange have assured me that the industry had reached such a stage that they could make nothing on their own fruit, but that they evened up and managed to live on the profits that they made in handling the fruits of their neighbors. A sad state! So far as I know, there isn't a factor today operating in Florida, California, or in any other of the markets of this country, who doesn't admit that the influence of green or immature citrus fruits on the market is such as to destroy values. It curtails consumption, reduces the volume of business that can be handled by wholesale fruit dealers, who of necessity are the distributors after the fruit reaches the markets, and deprives the grower of a living price for his product. The cause producing this effect is the failure on the part of the consumer to accept this fruit and pay their good money for it.

The Western Fruit Jobbers' Association of America held its annual convention January 3-4-5, 1912, in St. Louis. On page 76 of the report of their proceedings is found the following language, embodied in the report of the Legislative Committee of that Association:

GREEN CITRUS FRUITS. Our Secretary also requested the advice of the Committee upon "Food Inspection Decision No. 133," of the United States Department of Agriculture, relative to the coloring of green citrus fruits. It would appear from the ruling of the Board of Food and Drug Inspection that it is not intended to interfere with the commercial movement of oranges or lemons, where the fruit has attained maturity, size and acidity, even if the color should be greenish. In our opinion, this rule will not hurt business, but on the contrary, it will caution the grower and shippers not to be in too great hurry to pack and market their fruit. Green fruit or immature fruit, artificially colored at the opening of the season, is often detrimental to the jobbers' interests, and we believe that if growers and shippers would hold the fruit until it matures, the consumption would be increased. We recognize the difficulty of discriminating between the various grades of greenness, and feel that the Board of Food Inspection should be very careful in their decisions to the end that the industry may not be injured.

Correspondence with our members, through the office of the Secretary, leads us to believe that the jobbers prefer to handle mature, ripe stock, and further, wish to advance the orange and lemon growing industry in the United States."

On pages 132-134 is the following language:

Mr. S. E. Lux: Florida seems to have had the first trouble. We believe it would be better if the shippers of citrus fruits would wait until such time when the fruit is sufficiently matured before shipment is made. As jobbers, we naturally like to order early, and we always get the first car of oranges, but frequently when they arrive, they are as green as grass, with no color. They are immature, and the grocer who buys them is led to believe that they are fit for use. His customer buys them once, and may make another purchase, but finding them worthless, he refrains from buying more for some time, thereby retarding the consumption of fruit.

Mr. Chas. B. Bills: I would like to see this recommendation adopted. Last year we commenced shipping and packing oranges when they were about one-third colored. The result was that there was nothing but grief on all early shipments. This year I reversed the order of things, and did not allow a single grower to bring in fruit until it was well colored and sugared up to a certain percentage, and this season I have not had a single complaint.

Mr. Wagner: I move that the idea set forth under the heading, "Green Citrus Fruit," be recognized as correct in principle, and that the principles as therein enunciated be adopted as the sense of the Western Fruit Jobbers' Association of America.

The motion was seconded and carried.

Mr. S. E. Lux is one of the largest and most responsible wholesale fruit dealers in Topeka, Kans. Mr. Chas. B. Bills is the President of the Pioneer Fruit Co., at Sacramento, Cal., which handles a considerable volume of citrus fruits.

There is a moderate demand for oranges through this country for Thanks-

giving. Following this there is tremendous demand for oranges for the Christmas trade. There is a strong temptation on the part of all dealers to supply this demand, and for a great many years, California has indulged in the practice of shipping green oranges. She can put out but a limited quantity, however, for Thanksgiving, and as soon as these Thanksgiving orders are filled, they cut out their shipments until time to begin shipping for Christmas. They usually shut their packing houses down on the 8th to 10th of December, and do not open again until there is demand from the Eastern markets for oranges. There is a short period between the Thanksgiving trade and the Christmas trade which gives the dealers an opportunity to clean up the poor stuff which they have bought, which they rarely ever do at a profit to themselves or to the satisfaction of the consumers. After the Christmas trade is over there is a lull, sometimes of thirty days before there is any considerable movement of California oranges. This gives their fruit an opportunity to mature. In Florida there has been a disposition to begin in September and to keep a continuous stream of oranges going to market, regardless of market conditions or the maturity of the fruit, and we can look back over the past ten years, prior to the season of 1911-12, at the consecutive years of disaster to growers and dealers, due to this foolish policy of forcing immature oranges upon people who do not want them, and will not have them. In a vain effort to persuade growers affiliated with the Exchange, and operators not affiliated with it, to refrain from this suicidal course, the Exchange took up the matter of legislation and succeeded in having a bill passed by the Florida Legislature making it a crime under the law for any person to ship, or offer for shipment, from this state, citrus fruits that were immature or otherwise unfit for consumption. This act passed the Legislature almost immediately. It was heralded as a good law. Practically before it was out of the hands of the Governor, agencies who had profited and would continue to profit through the handling of this immature fruit, took steps to offset its good influence, and to this end were reported to have employed counsel to go into the law, dissect it and discover a weakness if it was there, which would make it inoperative. Some of their number visited Tallahassee, and in some of the trade and daily papers appeared what purported to be an interview with these gentlemen, in which it was stated that the law made no provision for its enforcement; hence it was a dead letter. They were reported to have formed a pool among themselves, each one paying his pro rata of the expense, to fight it. The Florida Citrus Exchange, after the law was passed, took it up with the Commissioner of Agriculture, whose duty the Exchange officials had been advised it was to have this law enforced through the State Pure Food Department. The Commissioner of Agriculture took the position outlined in the purported interivew above referred to, and the Attorney-General of the State was appealed to through the Commissioner of Agriculture. In the opinion rendered by the Attorney-General, Park Trammell, under date of October

10, 1911, addressed to Hon. B. E. McLin, Commissioner of Agriculture, the last paragraph read as follows:

> Under the General Pure Food Law, you have the authority to have examinations and inspections made of citrus fruits for the purpose of ascertaining whether there is any misbranded or artificially colored fruit. Construing the "Immature Fruit Law" and the general "Pure Food Law" together, it is my opinion that your Department is authorized to make inspection of alleged green fruits and make such reports thereon to the proper police and law officers as may be required by law. Under the "Immature Fruit Law," however, the action of your Department would, perhaps, for reasons herein stated, be entitled to no more consideration than a complaint made by any citizen or the State who may complain and allege a violation of said statute.

A lengthy correspondence ensued between the officials of the Florida Citrus Exchange and the Commissioner of Agriculture, the latter taking the position that the immature fruit law was a general law, that it did not devolve upon him to enforce it, nor to participate in enforcing it, and refused absolutely to have anything to do with it. The Florida Citrus Exchange based its action upon the opinion rendered by the Attorney-General as quoted above, insisting that the Commissioner of Agriculture perform the duty devolving upon his office. The Exchange sent a personal representative to Tallahassee, employed counsel there other than the Attorney-General, and together they interviewed the Commissioner of Agriculture, at which interview State Chemist R. E. Rose was present, and in which he participated. The Exchange representative, with its attorney, conferred with the Attorney-General, who reaffirmed his opinion that the two laws should be construed together, the "General Pure Food Law" and the "Immature Fruit Law," and that under this construction, it was the duty of the Pure Food Department of the State to make inspections where complaints were filed and to secure samples and to hold these samples subject to inspection by the proper officials of the law. The Florida Citrus Exchange requested and urged the Commissioner of Agriculture to appoint inspectors to do this work, offering to defray the expense if there was no fund available from the State for this purpose. The whole line of correspondence developed the fact that neither the Commissioner of Agriculture nor the State Chemist desired to, or had any intention of lending their moral support to the enforcement of that law, nor to discharge the duty devolving upon them under the opinion rendered to the Commission of Agriculture by the Attorney-General of the State, whose duty it is to advise the Agricultural Commissioner and Pure Food Department as to their duties in such matters. On October 6, 1911, Commissioner McLin addressed a letter to Mr. W. C. Temple, General Manager of the Florida Citrus Exchange, Tampa, Fla., in which he says:

> I have referred to the Attorney-General the proposition as to whether I would be authorized to take any legal steps as an official under the immature fruit statute. Should the Attorney-General hold that I am mistaken in my views as to a want of authority under the provision of the said immature fruit statute, I shall conform to his opinion on the subject, as he is my legal adviser on such matters. Having submitted the question to the Attorney-General, I will transmit to you a copy of his opinion on the subject."

It will be seen from the Commissioner's statement in this letter that he had submitted the proposition to the Attorney-

General and that he would abide by the Attorney-General's decision. However, after this decision was rendered, the Commissioner of Agriculture did not change his views. We were again advised by him that the immature fruit law was a general law, that it could be enforced only by the usual process for enforcing general laws, that some citizen should complain to the proper officers in his county, that this officer should take the usual routine, and that the fruit should be brought before a court which would determine on examination whether or not the fruit was immature within the meaning of the law. There appeared to be no course open to the growers of Florida except through their organization, the Florida Citrus Exchange. The Florida Citrus Exchange was therefore forced into an attitude of prosecutor in an effort to have this law enforced, giving the growers of this State the protection they were entitled to in restraining persons from violating this law, thereby destroying the markets for their product. A number of arrests were made in this State for violation of this law, but admittance to houses that were known to be shipping green and immature oranges was forbidden to growers affiliated with the Exchange who were interested in the enforcement of this law.

At this juncture, some of the largest and most notorious shippers of immature fruit were shipping freely and closed their packing houses to the public, refusing to admit any person to their houses who could make an inspection and file a complaint, as sufficient information could not be gathered upon which complaint could be filed, as the complainer had to make a specific charge that he had seen this fruit packed, loaded and shipped.

On October 5th, the following telegram was sent to B. E. McLin, the Commissioner of Agriculture at Tallahassee, Fla., signed by William Chase Temple:

Tampa, Fla., Oct. 5, 1911.
Hon. B. E. McLin, Commissioner of Agriculture, Tallahassee, Fla.

As a citizen, resident, taxpayer, property owner and voter, in and of the State of Florida, I hereby inform you that one S. J. Carlton, of Arcadia, De Soto county, Florida, is daily violating the immature fruit law in shipping and offering for shipment immature and unripe citrus fruits at and from Arcadia in violation of said law, and the pure food act, and I hereby demand of you, as the sworn State official whose duty under said act is to see to the enforcement thereof, to dispatch to Arcadia forthwith an inspector from your Department having proper authority to inspect, seize, condemn and dispose of such immature citrus fruits so offered in future for shipment, contrary to laws of State of Florida, with instructions to said inspector to perform his duty under said law, and I request you to telegraph me, charges collect, on receipt of this information, whether it is your intention or not to comply with this demand, so that in case of your refusal to perform your sworn duty, proper steps may be taken as provided by law and custom in such cases.

(Signed) WILLIAM CHASE TEMPLE

To this Mr. McLin replied:

Tallahassee, Fla., Oct 5, 1911.
Mr. Wm. C. Temple, Tampa, Fla.:

Your telegram received. The immature citrus fruit law is a general law. This Department has nothing to do with its enforcement. The enforcement of this law is entirely in the hands of the District Attorney of that Judicial Circuit. The pure food inspectors have no authority in these cases. See my letter of July 14th last.

(Signed) B. E. MCLIN, Com. Agri.

Mr. Temple then sent this telegram:

Tampa, Fla., Oct. 5th, 1911.
Hon. B. E. McLin, Com. of Agri., Tallahassee, Fla.:

My attorney, with others consulted, disagree entirely with your contention. Your letter July fourteenth was believed then and now as insincere, disingenuous and merely a subterfuge to avoid a troublesome but imperative duty. Answer frankly. Do you refuse to act on my infor-

mation in Arcadia matter? Next step already planned awaiting your decision.
(Signed) W. C. TEMPLE.

To this Mr. McLin's reply was:

Tallahassee, Fla., Oct. 6, 1911.
Mr. W. C. Temple, Tampa, Fla.:
Replying to your two telegrams which are before me this morning, the second of which is improper and uncalled for on your part, my position is unchanged. See letter.
(Signed) B. E. McLIN, Com. Agri.

Our representative who visited the Commissioner of Agriculture, in company with our attorney at Tallahassee, made a strong appeal to the Commissioner of Agriculture and the State Chemist, pointing out the opinion of the Attorney-General of the State above quoted, and the Commissioner of Agriculture finally agreed to send an inspector to the packing house complained of by Mr. W. C. Temple.

On November 4th, the Florida Citrus Exchange sent to Hon. B. E. McLin, Commissioner of Agriculture, the following telegram:

Tampa, Fla., Nov. 4, 1911.
Hon. B. E. McLin, Commissioner of Agriculture, Tallahassee, Fla.:
In accordance with your conversation with Quinby, we earnestly request you to instruct Inspector Jordan to inspect fruit now being shipped by S. J. Carlton from his Arcadia packing house, as these oranges are immature and unripe, and are being offered for shipment in violation of the law, and have inspector seize a sample box of these oranges and send to State Chemist for examination, and if possible analysis for citric acid and total sugar content. Will you notify us when seizure is made so we may inspect in Tallahassee.
.. FLORIDA CITRUS EXCHANGE.

On November 6th, the Exchange received the following reply from Hon. B. E. McLin:

Tallahassee, Fla., Nov. 6th, 1911.
Florida Citrus Exchange, Tampa, Fla.:
Inspector Jordan wires me that after careful inspection of fruit in Mr. Carlton's packing house at Arcadia, he is satisfied Mr. Carlton is not shipping any fruit immature or unfit for consumption in his judgment. I advised not necessary to purchase under these circumstances.
(Signed) B. E. McLIN, Com. Agri.

In reply to this telegram the Florida Citrus Exchange wired the Commissioner of Agriculture as follows:

Tampa, Fla., Nov. 6, 1911.
B. E. McLin, Commissioner of Agriculture, Tallahassee, Fla.:
Then we are to understand that your previous statement to the effect that none of your inspectors were competent to decide whether citrus fruit was mature or not mature was a mistake, and you now admit that Inspector Jordan is fully competent to so decide. Are we correct?
(Signed) FLORIDA CITRUS EXCHANGE.

To this Commissioner McLin replied by wire on November 6th:

Tallahassee, Fla., Nov. 6, 1911.
Inspector Jordan advises this office that the fruit at Arcadia is all right. That should satisfy you. It must govern us.
(Signed) B. E. McLIN, Com. Agri.

State Chemist Rose was invited to read a paper before the Citrus Growers' Convention held under the auspices of the Florida Citrus Exchange at Tampa April 18, 1912. In this paper, Mr. Rose criticised the Florida Citrus Exchange for unjustly attacking the late Commissioner of Agriculture, Hon. B. E. McLin, referring particularly to the Florida Grower of March 23 and April 6.

In the Florida Grower of March 23 was printed a bulletin sent by the Florida Citrus Exchange to all Sub-Exchanges and Associations and Special Shippers and citrus growers of the State, which bulletin stated in part: "It is a matter of history, the attitude assumed by the incumbents of these two offices last fall towards the enforcement of the Immature Fruit Law, and it is well remembered that the laxity shown by their Departments worked toward nullifying the Act passed

by the Legislature against the shipment of immature or unripe fruit, commonly known as "The Green Fruit Law." We regard it as unfortunate for the industry that the present incumbent of the office of State Chemist is again asking for the suffrage of the voters, as he has placed himself on record as stating that the law is a foolish one, and that he would not care to make a fool of himself trying to enforce a nullity."

I have scanned the columns of the Florida Grower of April 6th and fail to find any reference therein to the late Commissioner of Agriculture or the State Chemist from the Florida Citrus Exchange.

Last September, I had the pleasure of spending several hours with Mr. B. E. McLin on the train between Tallahassee and Jacksonville. My acquaintance with Mr. McLin covers a period of twenty-six years. In the early nineties, it was my pleasure to assist in the election of Mr. McLin to the Florida Senate, in Lake county. His opponent at that time was Major Alex. St. Clair Abrams.

I have always held Mr. McLin in the highest esteem, believing him to be an honest man, true to his convictions and ready to do his duty, when he was convinced that it was his duty. I discussed this Immature Fruit Law with him, and he was very emphatic in his view that it was no part of his duty nor that of the Pure Food Department, which was under his control as Commissioner of Agriculture, to enforce or to attempt to enforce this law.

Prior to the publishing of the bulletin quoted above, State Chemist Rose visited the Florida Citrus Exchange and assured me that he would have been more disposed to have enforced the law and would have been more active in its enforcement but for the aggressive letters and telegrams from this office. He further stated that all of those letters passed over his desk and under his supervision. In this conversation with Mr. McLin, he dwelt upon the fact that he was overworked; that there were three departments of which he was the head, while in every other State each had a head of its own, independently of the other departments. After this interview with State Chemist Rose, the Florida Citrus Exchange dismissed Mr. McLin from thought or connection with the matter. It has no fight to make upon dead people. The State Chemist, however, was very much alive, and entertaining the views that he expressed then—and so far as I know, continues to hold—the Florida Citrus Exchange believed, and believes now, that he was responsible for the non-enforcement of that law, and that if he was re-elected or appointed by the Governor that he should be put on record as to the course he would pursue in the future in this matter.

I assume that having stated that these matters were all referred to him, and coupling this statement with Mr. McLin's statement that he was overworked, and the further statement in the paper read by State Chemist Rose before the Growers' Convention, that the Florida Citrus Exchange had criticised Mr. McLin, and finding nothing in this Bulletin of March 23 that could be construed as an attack upon Mr. McLin, we are left to the conclusion that Mr. Rose, while eulogizing

the deceased Commissioner of Agriculture, was really eulogizing Rose and taking to himself a fancied attack which he thought had been made.

Being at the head of the Pure Food Department, which was under the supervision of the Commissioner of Agriculture, there was nothing more natural than that the Commissioner should have followed the advice and abided by the decision of the State Chemist in all matters pertaining to his department. It was also natural that the head of the Pure Food Department should avoid performing this disagreeable function if he could do so.

In this interview with Mr. Rose he emphasized the fact that the Florida Citrus Exchange handled but twenty per cent. of the citrus fruit shipped out of the State, and that there was eighty per cent. on the outside. I have been informed that the State Chemist is a very astute politician. Every politician keeps his ear to the ground; Mr. Rose could hear the tread of the twenty per cent. of the citrus growers of this State in this appeal from the Exchange and he assumed that the other eighty per cent. were marching on the other side.

This reminds me of a cartoon that I once saw in Puck. There were two fishermen on the banks of a little lake on the orange belt line. They were waiting for the train. One of them had his ear to the rail listening for the coming of the dinky little train that ran on that little narrow-guage track. His friend was looking in the opposite direction when the little engine came up and struck the bald head of the listener. The shock threw the little engine in the air; the listener brushed his head and said, "Brush that fly away, and let me listen for that train."

In this effort of the Florida Citrus Exchange to induce the Commissioner of Agriculture, through the Pure Food Department, to abide by the decision of the Attorney-General and lend his aid to the enforcement of the Immature Fruit Law, the Florida Citrus Exchange put the Commissioner on notice that if he failed to do his duty, the Exchange would be forced to resort to drastic measures, foreshadowing the lettergram sent to the Pure Food Departments of various States, warning them against the flood of immature, poisonous oranges that the country was about to be flooded with.

The Commissioner disregarded this warning, making it necessary to resort to this drastic measure. After weeks of deliberation and exhaustive effort to stop the shipment of green fruit, that lettergram was sent. It meant success or failure to the citrus industry of this State; the sending of this lettergram, which was published in the press throughout this country, and favorably commented on editorially by the leading newspapers of the country.

The opponents, who thought they had successfully defeated the law, and were at that time violating it, had green fruit scattered throughout the country, which was refused and some of it condemned.

The next tread of footsteps that Mr. Rose heard was the call for the convention at Orlando to condemn the Florida Citrus Exchange for sending out that telegram —that iniquitous lettergram. That convention was advertised and heralded over

the State. Systematic campaign work was done. Major Alex. St. Clair-Abrams was selected to manage the campaign. He wrote a series of caustic letters, published in the Times-Union, and at a given time, the convention assembled in Orlando. That convention is history. There were thirty-three faithful; their names were published, and no doubt when up the thirty-three, he felt that there must have been some miscalculation in his estimate of the 80 per cent.

The strongest objection ever urged by the opponents to the Immature Fruit Law is that there is no standard fixed by the law for determining the maturity of an the State Chemist read that list and recognized the character of the men who made orange. Mr. Rose emphasized that very strongly in the paper read before the Citrus Growers' Convention at Tampa on the 18th of April.

In order that this question might be settled for all time, the Florida Citrus Exchange took the necessary steps to provide the information which is given in the following table:

CITRIC ACID—I—TO TOTAL SUGAR AS INVERT

	Nov.	Dec.	Jan.	Feb.	Mch.	April
Homosassas	.....	11.13	15.03	14.39	16.38	24.50
Parson Browns	....	12.55	15.75	20.72	19.89	27.27
Indian River	....	11.22	10.04	10.45	12.35	38.24
Volusia Seedling	....	8.52	11.17	13.52	14.61	.....
DeSoto Seedling	....	7.06	8.91	9.94	13.17	16.04
Orange Co., "Whitefly"	5.79	6.00	7.75	9.85	14.80	16.50
Orange Co. Valencia Late	5.16	8.44	9.55	12.85	12.59	17.30
"Bull Dog" Brand	8.92	7.76	8.21	9.53	12.80	.....
"Camel" Brand	9.03	6.72	8.75	9.49	14.39	.....
Boston Auction—Floridas	....	7.62	9.49	.....	.....	.....
Cincinnati Auction—Floridas	....	7.90	8.30	.....	.....	.....
Philadelphia Auction Floridas	....	7.46	9.32	.....	.....	.....
New York Auction—Floridas	....	8.73	9.55	11.68	.....	.....
N. Y. Auction—Cal. navels	....	4.66	4.91	5.72	6.14	7.21
7samples Parson Brown	16.52					

Sweet, 9.96; Very Sweet, 12.08; Very Sour, 3.48; Sour, 4.87; Tart, 7.20

With this data, it is practicable for the next legislature to establish a standard such as the State Chemist and the opposition clamor for.

Looking forward to this, the Florida Citrus Exchange began the work at the opening of the season, in order that there might be no recurrence of the past season's experience.

The Florida Citrus Exchange, in sending the famous "Poison Telegram" never doubted the outcome. It not only put consumers on notice of this immature

stuff, but it also put them on notice that if this fruit was left on the trees, it would mature, and in due time they could buy Florida fruit that would be the finest in the world.

There have been many statements that immature Florida oranges are not poisonous, and therefore that telegram was a libel. In the Standard Dictionary is found the following definitions:

"Poison"—a. Any substance that, when taken into the system, acts in a noxious manner by means not chemical, tending to cause death or serious detriment to health.

Poisons may be classified as (1) irritants, which act by causing local inflammation and irritation, including pure irritants, not chemically destructive."

One of the most prominent attorneys in this State has stated in public that the eating of a portion of an immature orange caused the death of his baby.

Did that telegram accomplish its purpose? Let these figures answer. Although the shipment of green fruit was very largely restrained through the activity of the Florida Citrus Exchange, the total shipments up to and including December 24, 1911, were but 150,000 boxes short of the season previous, to the same date. After the Christmas trade was over in the markets, there was no glut anywhere. Had shipments ceased the 15th of December, there would have been no stock in the markets, and shipments could have been resumed the 1st of January at $2 per box f.o.b. shipping point, and there would have been no break thereafter with properly regulated shipments. The market advanced from the beginning of the Christmas movement, and, barring the period which was required to dispose of the stock that was shipped after the 15th of December, and which reached the market in a badly decayed condition, the market again advanced to $2, and there was no break to the end of the season. Looking over the market of the citrus crop of this State this was marvellous.

Although the shipments for the season of 1910-11 up to Christmas exceeded the shipments of 1911-12 only 150,000 boxes the markets were paralyzed in December, and did not recover until after the middle of February. There was a dead market for sixty days, during a period when large shipments could have been moved at satisfactory prices, had consumers not been disgusted with the green fruit that had been forced on the market.

From the issue of October 26, 1911, of the Florida Produce News (the pink sheet) I take the following statement, and it must be borne in mind that this sheet is the mouthpiece of the opposition to the Exchange:

Extracts from Pink Sheet of October 27, 1911.

"The public meeting of independent orange growers called for next Saturday, November 4th, at Orlando, promises to bring to the front the strongest factors in the citrus industry of the State. Never before have the growers been so thoroughly aroused to the dangers surrounding them. Many who have watched the program of the Exchange in silence, observing its work step by step are now lined up with the most determined opponents of the present management of that organization.

The Exchange's ill-fated lettergram printed in hundreds, even thousands, of newspapers from California to Maine, has literally started a flame of resentment.

"It is now up to the independents to try at least to stay the bad effects of the Exchange's program. The Orlando meeting will be well attended by experienced growers, many of whom have thousands of dollars invested in the industry."

"A loss of 25 cents on each box on a 5,000,000 box crop means growers will pay a cool million and a quarter dollars for the results of the Exchange's brilliant lettergram. And there are observing dealers who believe that the crop will not average within 25 cents as much as it did during the past season, comparing like conditions month by month." . . .

"No sane receiver who has ever handled oranges wants green fruit. He knows full well that buyers, once they find they have been 'caught,' will fight shy of the next sale. This hurts the receiver as well as the shipper." . . .

The following statements of averages by months for oranges marketed through the Florida Citrus Exchange during the season of 1910-11 and 1911-1912 are enlightening. That claim established the value of the Pink Sheet as a prophet. At the expiration of this marketing season, the Exchange will have handled 750,000 boxes of citrus fruits for its constituents.

GRAPEFRUIT

October	$3.06	$3.63
November	2.53	3.38
December	2.01	3.21
January	1.73	3.52
February	1.68	3.82
March	1.55	3.67

General season average, Oranges

1910-11	$1.50
1911-12	1.90

General season average, grapefruit

1910-11	1.95
1911-12	3.60

An increase in price in oranges of 40 cents a box, as against the opposition's prognostication that the crop would average 25 cents a box less.

There is an increase in grapefruit of $1.65. The total shipments of grapefruit from the State for 1911-12 were far short of those of 1910-11. The percentage of grapefruit marketed through the Exchange for the season of 1911-12 in proportion to the oranges handled by the Exchange was much larger than the previous year.

There have appeared in the Jacksonville Times-Union leading editorials severely criticising the management of the Florida Citrus Exchange.

I stated at the Tampa Convention that the sending of that poisonous telegram had saved to the growers of Florida the past season two million dollars. The Times-Union calls for the proof. I am not in position to say what growers have received for their fruit which was not marketed through the Exchange. The fact that 83 per cent of the citrus crop went through other channels is prima-facie evidence that those who owned it felt that they could get more money outside than they could in the Exchange. Assuming that they got as much, with a crop of around four and a half million

boxes, my statement appears to be a very reasonable one.

If the growers outside did not get as much money for their fruit, why did they not?

The last paragraph of this editorial reads as follows:

"Some men are always more easily led than driven and a conciliatory policy will greatly strengthen the Exchange and add rapidly to the percentage of the Florida fruit at its command."

The Florida Citrus Exchange is managed by a Board of Directors elected from among the growers themselves, who hold regular meetings, employ a general manager who recommends to that board heads of departments which are passed upon by the board, who preform the duties devolving on them under the supervision of the Board of Directors. Such a board must, of necessity, be capable men, or they would not be elected by their fellow growers.

They have been for three years trying to persuade other growers to come into the fold. They have not been trying to kick them in, nor to kick any of them out. It is recognized that if the grower secures for his product a satisfactory price, it must be done through his own efforts,

There is no man, and no set of men, who can dominate the policy of the Exchange, unless it is done by the sanction of the Board of Directors, who are directly responsible to their fellow growers, who elect them to this responsible office.

It is rather interesting to read the paragraph quoted above, and it would be more interesting to have the writer who penned it state who is to be conciliated, and how?

TABULATED RESULTS OF ORANGE JUICE ANALYSIS EXPERIMENTS FOR THE FLORIDA CITRUS EXCHANGE, SEASON 1911-12

So much having been said, publicly and privately, after the passing of the Immature Citrus Fruit Bill, as to when an orange was ripe or when it was sweet, or when mature, that the Florida Citrus Exchange decided to carry on a series of experiments in the way of analyses of oranges from different localities at different times, in order to determine some of the uncertain questions at point.

Some years ago, certain experiments were made by the Bureau of Chemistry of the U. S. Department of Agriculture in the way of analyses of oranges at different stages of maturity, being very careful in their determinations of the total percentage of citric acid in the juice and total percentage of sugar as invert in the juice, and the Exchange line of work was inaugurated to follow this plan much more completely and thoroughly than had ever been done before.

Wiley & Company, a firm of analytical chemists of Baltimore, of undoubted reputation and ability, whose name and work are international, were selected, after due investigation, as the firm best equipped to carry on the analyses for the Exchange.

Four different sets of experiments were carried on simultaneously. First, arrangements were made with growers in seven localities in the State, whereby they would select a certain tree in their groves which should not be picked for any pur-

pose except these experiments, through the season of 1911-12. On the same day every month, at intervals of a month apart one dozen oranges were picked from each of these trees and sent to Wiley & Company for analysis. On arrival, the juice was carefully extracted from the oranges, thoroughly mixed and then tasted. The taste of the juice was classified either as "Very Sour," "Sour," "Tart," "Sweet," or "Very Sweet." After this notation was made on the test sheet, the analysis was proceeded with for total determination in accordance with the outlines of the experiments carried on by Drs. Bigelow and Gore, of the United States Department of Agriculture, some years previous.

The seven trees so selected were as follows: a Homosassa in Polk County; a Parson Brown at Lake Weir; an Indian River Seedling tree at Mims; a Volusia County Seedling at Lake Helen; a DeSoto County Seedling at Punta Gorda; a whitefly infested sweet seedling in Orange County and a South Lake Apopka Valencia Late orange.

In addition to these experiments, arrangements were made with the Winter Park Packing House to take on the same day one orange from each and every bin in the "Bull Dog" sizers in that packing house, packing them up and marking the package "Bull Dog," at the same time taking one orange from every bin in the "Camel" sizers in the packing house, marking that sample "Camel." These samples were sent each week during the entire time the house was in operation, from November to March, inclusive, and were analyzed for citric acid and total sugar as invert by Wiley & Company.

Further, in order to get as nearly as possible a general average of the contents of fruit shipped from Florida to the northern markets, arrangements were made in the Boston, Cincinnati, Philadelphia and New York auctions as follows: at each of these points a sample of Florida oranges was taken from each and every car sold at the auction, every auction sale held at these points in the months of December and January, and in New York the period was for the months of December, January and February.

The greatest care was taken in this entire line of experiments to remove as nearly as possible all element of error, either in the selection of the samples or in the chemical determinations. In the neighborhood of three hundred complete analyses were made in carrying out this plan, and the tabulated result is very interesting.

It is especially interesting to note that all the samples of orange juice that were marked "Very sour," averaged 3.48 times as much sugar as citric acid. All the analyses of oranges which were marked "Sour," showed an average of 4.87 times as much sugar as citric acid. All the analyses of oranges which were classed as "Tart," showed an average of 7.23 times as much sugar as citric acid, while the average of all the samples designated

At the New York auction, samples of the California Navels were taken in the same way; that is, a sample from each and every car sold at every sale held in New York for the months of December, January, February, March and the first fifteen days in April.

"Sweet," was 9.96 times as much sugar as citric acid, and the "Very Sweet" classifications averaged 12.08 times as much sugar as citric acid. In every case the sugar as calculated is total sugar as invert, and the percentages are percentages in weight to the total weight of the juice.

As before stated, in every case, no matter from what source the sample was received by Wiley & Company, on arrivel the juice from each separate sample was carefully extracted and before being analyzed, was thoroughly mixed to make a true, composite sample of juice from the whole and then tasted for sweetness. The taste of the juice in every experiment—some three hundred in number—was classified either as "Very Sour," "Sour," "Tart," "Sweet," or "Very Sweet," and it was not until after this determination of flavor had been made and noted on the data sheet of the test that the analysis was proceeded with.

With this explanation, the table of results as calculated is given on preceding page.

DISCUSSION

Capt. Rose: I am very much pleased and intensely interested in the remarks of my friend, Mr. Burton. He and I personally are very good friends. I also am a friend to the Florida Citrus Exchange. As I stated in my paper, it is an institution which should be supported actively by the Florida fruit growers.

I am also very much intersted in the work he has had done by the Citrus Exchange, which will give us something by which we can measure the maturity of an orange. This is the first series of exhaustive analyses that has been made, and it is barely possible that a standard may be fixed, chemically, for judging the maturity of the fruit, provided a date is fixed at the same time. It is impossible to keep the run of proportions of acid to sugar in the reading of the paper. Generally, the results correspond very closely with those of the United States Department of Agriculture, the California Department and also our own. Now, with a standard of one to seven, or one to eight, being fixed, you have also to fix the date, because you will notice that the "sour" or "very sour," the "tart," the "sweet" and the "very sweet," occur at different dates for different varieties. That is the position I have taken; that some standard would have to be legally established.

I will say for Mr. Burton that I have carefully listened to what he had to say, and I must say that he stated "nothing but the truth"; but I must also say that he did not state "all of the truth." He read the final clause of the attorney-general's letter in reply to the commissioner's request for an interpretation of his duty under the "Immature Citrus Fruit Law."

I plead guilty to the fact of being present at the interviews with the attorneys, some very capable ones on both sides, and the general conclusion was, and is, that the "Immature Fruit Law" was against the sale of green fruit, but that you had to prove the fact to the satisfaction of a jury, or be subject to an action for damages.

I attempted some years ago to have a standard fixed for intoxicating liquors. I suppose I have introduced that same bill into half a dozen legislatures. I do not care what percentage is fixed as to the percentage of alcohol constituting an intoxicating liquor, some standard should be legally fixed. If you can prove, in the present status of the matter, that liquor which intoxicated one man did not intoxicate another man, you have to give the "blind tiger" the "benefit of the doubt." If this 5 per cent. or 6 per cent. or 50 per cent did not intoxicate a particular man, it was not intoxicating liquor. I hope eventually, however, to have a standard fixed.

Reading from the same correspondence from which Mr. Burton quoted, let me read first a letter from Mr. McLin to the attorney-general, and then I will read in full the letter from which Mr. Burton read an extract.

Tallahassee, Fla., Oct. 6, 1911.

Hon. Park Trammell, Attorney-General, Tallahassee, Fla.:

Dear Sir:—The Citrus Fruit Exchange of Florida is of the opinion that it is the duty of the Commissioner of Agriculture to enforce "The Immature Fruit Law," that is, Chapter 6236, Laws of Florida, Acts of 1911, which law forbids the shipment of immature citrus fruit from the State and makes such immature fruit subject to seizure and dispositon as in the case of adulterated or misbranded foods or drugs, when the owner of such fruit is making an effort to ship it in conflict with said law.

I have been unable to see where I, as Commissioner of Agriculture, have any authority under this law, but if it is my duty to enforce it, I should know it at once and I, therefore, respectfully ask for your opinion as to my duty in the premises, with the request that you furnish it to me at the earliest moment practicable.

Very respectfully,

(Signed) B. E. McLin,
Commissioner of Agriculture.

STATE OF FLORIDA
OFFICE OF THE ATTORNEY-GENERAL
Park Trammell, Attorney-General.
(Receiveed noon, Oct. 13, 1911).

Hon. B. E. McLin, Commissioner of Agriculture, Tallahassee, Fla.:

Dear Sir:—Replying to your letter of the 6th inst. requesting my opinion as to whether or not it is incumbent upon your department to enforce the "Immature Fruit Law," being Chapter 6236, Laws of Florida, Acts of 1911, I beg to advise that I fail to find in this law any provision directing or making it specifically your duty to enforce the same. The law is a general criminal statute with no special direction or provisions set forth therein for its enforcement. It is incumbent upon the police and other law officers of the State to enforce this as other criminal statutes. The law in no wise refers to the general Pure Food Law, further than to contain in the penalty clause the following: "And the fruit, whether immature or otherwise unfit for consumption or misbranded shall be subject to seizure and disposition as in the case of adulterated or misbranded foods and drugs." In all cases where a seizure is authorized under the general pure food law, the law specifically defines what constitutes a misbranded or adulterated article, but the statute which we are considering merely makes it unlawful for a person to sell, offer for sale, ship or deliver any "citrus fruits which are immature or otherwise unfit for consumption" and fails to define what constitutes immature fruit unfit for consumption. The standard not being fixed by the law it is a question for the consideration of the courts as to whether or not any particular lot of fruit "is immature fruit unfit for consumption" or to adjudicate the question as to what constitutes "immature fruit unfit for consumption."

While Section 9 of Chapter 6122 of the Laws of Florida, which is part of the general Pure Food Law, would possibly authorize seizure under the "Immature Fruit Law" in cases where the court sustained the charge that the accused was offering for sale or selling citrus fruits which were immature or otherwise unfit for consumption, yet in cases where the accused is acquitted I doubt very much if the authority given by said Section would protect you against an action for damages.

Under the general Pure Food Law you have the authority to have examinations and inspections made of citrus fruits for the purpose of ascertaining whether there is any misbranded or artificially colored fruit. Construing the "Immature Fruit Law" and the general "Pure Food Law" together it is my opinion that your department is authorized to make inspections of

alleged green fruits and make such reports thereon to the proper police and law officers as may be required by law. Under the "Immature Fruit Law," however, the action of your department would, perhaps, for reasons herein stated, be entitled to no more consideration than complaint made by any citizen of the State who may complain and alleges a violation of said statute.

Respectfully submitted,

PARK TRAMMELL,
Attorney-General.

I do not think I need to go further into the matter. I am exceedingly glad that this has been brought up and particularly that I shall be able to get this information in our proceedings, and with that information it is possible you can get your legislature to define immature fruit, and then we can base our actions upon something definite. In this case, Mr. McLin had no more authority to seize shipments suspected of being immature than any of you gentlemen, or any other citizen of Florida, not knowing that he could establish the fact that the goods were green. If the court said the fruit was not immature. he would have been responsible for damages to the party bringing action against him.

Mr. McLin and myself did all in our power; we requested the governor to allow us to employ expert inspectors, but the governor had no power to delegate such authority. He appointed two inspectors who are not chosen on account of their familiarity with the citrus fruits.

Mr. Hart: I have here a resolution that I would like to offer. I have been a member of the Florida Horticultural Society since the adoption of its charter. I have been a member of the Florida Citrus Exchange from the very first. I went to California with the others to decide whether we should organize one or not. My heart is in both organizations. I want them to work together, as far as they can properly do so. I think that every orange grower in the state, every fruit grower and every property owner in the state, should recognize the value to the state of the work of the Florida Citrus Exchange. I am sure that they will do so if they thoroughly understand what has been done, under the conditions.

I followed the forming of the Citrus Exchange very carefully to see that no hardship was put upon anyone by it, in joining. I can assure you that there is none. If a man has built up a local market for himself, made a reputation for his fruit, he is not going to lose the benefit of that. If he has worked up a mail order business, he has not got to lose that. He can get the benefit of what he has done in the past, and still work through the Exchange, and help it, and not be a competitor to help bring its downfall.

We are in a hurry and therefore I cannot say what I would like to say. Many things are in my mind to say that I will have to leave unsaid. Possibly no one needed the Exchange less than I did. I was getting fine prices for my fruit; I knew that I could in the future, as I had always been able to market my fruit successfully. I know many in the state did not, and I felt it my duty to go into the Exchange, even if it cost me thousands of dollars the first year, but it has not done that, and now I am surprised at the prices

I obtain through the Exchange for the fruit I send to it.

I, therefore, wish to offer this resolution:

"Whereas, the Florida State Horticultural Society recognizes the necessity of organization for co-operation in the marketing of citrus and other fruits in order that the horticulturists may realize the full benefits from the fruits of their toil, it being possible only by earnest co-operation to realize these results and,

Whereas, the Florida State Horticultural Society recognizes the necessity of organization for co-operation in the marketing of citrus and other fruits in order that the horticulturists may realize the full benefits from the fruits of their toil, it being possible only by earnest co-operation to realize these results, and,

Whereas, the Florida Citrus Exchange has been of inestimable value to the citrus fruit industry of the state of Florida, the benefits of this organization extending to the state as a whole, and to every one of the fruit growers in the state, the nurserymen, the business men, to the professional men, and in fact to every business and industry of the state; stimulating investment and development as no other agency could; the benefits accruing to the citrus fruit growers alone has been at least three million dollars during the past year; and realizing that every citrus fruit grower marketing his fruit outside of an organization for co-operation in marketing is using his fruits and efforts against his own best interest and the best interest of the citrus industry, therefore,

Be it resolved, that we heartily endorse the Florida Citrus Exchange and its methods of marketing the fruit. We further commend the thorough and lucid way of keeping all accounts and records, making it possible for every shipper to know all the details of route of shipment and all the details of sales. We further heartily commend the perfectly open and above board way of treating its members.

Mr. Hume: There is one point in which there is no question in the mind of the chair as to whether we may not be out of order. We have a by-law, the third one in number, which says that the meetings of the Society shall be devoted only to horticultural topics from scientific and practical standpoints, and the presiding officer shall rule out of order all motions, resolutions and discussions tending to commit the Society to personal, political or mercantile ventures. Now, then, the question in the mind of the presiding officer is whether the Citrus Exchange is a mercantile venture. It is my opinion that it is. If the chair is sustained in this opinion—and I am perfectly willing to leave it to you—then the resolution as read is out of order.

Mr. Hart: I hope that will be discussed by the members here. I offered that resolution having that clause in mind, as the Citrus Exchange is not a profit-sharing institution. It is very different from endorsing a house that is handling our fruit, or a commission man, or a factor that is a profit-making organization. In this Florida Citrus Exchange, it is not the organization that makes the money. The Florida Citrus Exchange is the grower himself. There is not a dollar made by the organization as an organization. The organization is merely made up of the officers we have hired to do our work; therefore, it seems to me that it is placed outside of that clause so that we can act in the matter.

Mr. Blackman: In order to bring the matter before us, I move an appeal from the decision of the chair.

Mr. Skinner: Is the question discussable? It seems to me—I am not a member of the Citrus Exchange, but I am very friendly to it. I have no

personal objections to the resolution. I would be glad for everything that could be done to be done for the prosperity of any marketing agency to help market our Florida fruit. We need them all. I do not think that any marketing agency is large enough, or any set of men I know are broad enough and able enough to handle the whole output. It seems to me that it would be a great deal better for the marketing agencies in Florida to adopt the co-operative plan, rather than to fight against each other, as so many of them do.

If we adopt this resolution commending this medium of marketing our fruit, if there is any other organization that wishes to do so, they will have just as good right to demand a similar resolution from you.

I am not personally opposed to this resolution. I believe the Florida Citrus Exchange is a good medium. I believe it has done a great deal of good, notwithstanding it has done a great deal of harm. I should correct that, and say that I think it has done a great deal more good than harm. We are all human, and all make mistakes, but I will not criticize anything.

I say that the chair is right. The passing of this resolution will not end the matter. It may, and undoubtedly will, go further. This is a large Society; it is a pleasure to me to know this is the largest and most representative and best meeting of the Florida horticulturists. I believe we should sustain the chair; not for any antagonism against the resolution. If I cast my vote to sustain the chair, it is because I feel that his decision is in keeping with the clause in our by-laws.

Mrs. Hayden: I think we should be very careful not to establish a harmful precedent.

Mr. Sadler: I am a member of the Florida Citrus Exchange, and I want to say, from an experience of thirty-five years in the business, the Exchange, representing only 20 per cent. of the growers, has done more good to put the business in a fair way to prosperity than all other agencies put together. It is the only thing we have before us now that is a marketing agency that strictly represents the grower; it is not an organization for profit and I do not see how it could be termed a mercantile venture. I am in full accord with Mr. Hart. We don't want to have the whole thing; we want only enough to live. If the Exchange has done good work with 20 per cent. what would it do with 40 or 50 per cent.?

Handling and marketing our crop has been chaos and confusion from the beginning until the present moment. If there had been any marketing agency that could handle it reasonably well, we would never have had the Citrus Exchange, but through the fault of improper marketing, it had gotten to the point where groves had no value

I stand here as an orange grower and plead that the growers of the state of Florida, if this will help the Citrus Exchange, pass this resolution, and if any other organization that is of as much service to the industry as this has been should ask for a similar resolution, I should say "God speed" to it.

Mr. Hume: Just let me say a word in my own behalf. I am heartily in sympathy with the work the Florida Exchange is doing, and the whole question is simply my interpretation of our by-law. I won't feel bad if you will not sustain me.

I will now put the matter before you. The question arises as to whether the chair shall be sustained in its ruling that the Florida Citrus Exchange is a mercantile venture. Those in favor of sustaining the chair will please say "aye." Contrary "no." (Motion lost.) The "noes" have it.

I will now put the resolution. You have heard the resolution read. Those in favor of adopting the resolution will please say "aye." Contrary "no." (Motion carried.) The resolution is thus adopted by the Florida Horticultural Society.

Mr. Burton: My friends, let me tell you what the Western Fruit Jobbers Association is. Every wholesale fruit dealer in the western states is a member of the Western Fruit Jobbers' Association. When they hold their annual meetings, they take up all subjects of interest. They take up subjects just as you do here; they have their legislation committee and it is the official action of that body which puts its foot down upon shipments of green, immature fruit into their territory for them to handle.

You understand, of course, that I am discussing this question from the commercial point of view. The commercial end of it is so intertwined with the producing end of it that there is no separation.

You want to know what effect upon your pocket the shipment of green oranges has, and that is what I am trying to give you.

There is a general idea that people are clamoring for oranges in September and October. If you would take the trips I do from New York to Seattle, and Portland, and back to Jacksonville, zig-zag all over the country, and would go into the commission houses at that time, you will see that they are handling deciduous fruits: peaches, pears, plums, apples, and the like. That is what they want at that time. Then, along about Thanksgiving time they want oranges; not to eat, mostly, but for decorative purposes. Every table wants to have a dozen or more oranges, because they look so pretty. They generally buy California navels. A great many west of Chicago will buy California navels in preference to Florida oranges, because they have a good color; there is no rust mite or other discoloration on the outside. They set off the table like a bunch of holly.

When the meal is over, the oranges may be eaten; they may be thrown in the trash barrel, but they have served their purpose.

Then comes the demand for Christmas trade. Peaches are gone, plums are gone, there may be some grapes or pears stored; but then you can safely say the season for oranges is on. Every fruit has its season. If you were to go down the street to-day and saw a nice, fresh peach, you would buy it in preference to an orange. Why? Because it is a seasonable fruit.

Many a time I have stood at my desk and fought against the shipment of hard, green oranges. I knew they were not fit to eat, the commission man knew they were not fit to eat, but he wanted them because it was the first car. The grower insisted that it be shipped, because if he did not ship it then, he would not get the price. It was shipped, all right.

Out in California, they always make shipments in time for their fruit to get to the eastern markets for thanksgiving, and when the time is past and they cannot reach the markets for Thanksgiving, they close down and stay closed until it is time to ship for the Christmas market. Then they move heaven and earth to get their fruit through their packing houses and shipped east, but from the 8th to 10th of December, every packing house is closed down again. They have learned if they move that green stuff into the markets, disaster is sure to follow. In Florida, when the Thanksgiving rush is over, they keep moving. They do not seem to appreciate the fact that the people in the northern markets buy a few oranges for a specific purpose, and when that purpose is served, they are through. Florida people keep right on shipping, and when the Christmas trade is supplied, they are so afraid there is going to be a frost, or that the other fellow will get in ahead of them, that the individual cannot refrain from shipping.

This Exchange was criticized for not trying to get these outsiders together and make them act and operate to the good of the greatest number. When the law was passed, before the Exchange had an opportunity to do anything, they got together and determined they were going to defeat the end of that law, and we will see how well they succeeded.

You must bear in mind that at the beginning of this controversy the Commission of Agriculture and the State Chemist had stated they did not have an inspector who was able to judge of the condition of the fruit to meet the legal requirements. Upon receipt of this last telegram, the Commissioner of Agriculture did do his duty, and grudgingly wired one of the inspectors to examine the fruit in that packing house. He examined it and reported that it was "all right." First there was no one who was capable of judging the maturity of the fruit, and when it became necessary for an examination to be made, a man was sent who reported it "all right." Consistent, wasn't it?

I did not intend to inject anything into this discussion of a political character, but at this meeting I feel that I am meeting Capt. Rose on equal ground. We invited him to address the convention held in Tampa on the 18th of this month under the auspices of the Florida Citrus Exchange. He said some things which we would like to have made reply to, but he was our guest and we did not take issue with him. Since he himself has opened up this discussion, it is nothing but fair that I should present the side of the Citrus Exchange.

The Shipment of Immature Citrus Fruit

Capt. R. E. Rose
STATE CHEMIST

Mr. President, Ladies and Gentlemen:

It is not very inspiring to speak to so small a representative of a large body of men and women such as we have had at this meeting. I do not know that my address will be of any great benefit, or that it will open up any new line of thought. The subject has been an old one, a problem which has been presented to this Society, and to all the growers in the state, for years.

Before entering upon the discussion on that particular subject, I want to call your attention to the able report of our president at the auditorium night before last. If I were not so modest, I would have suggested that a special committee on the president's report should have been appointed in order that the meat of that report should have been digested by the people composing this Society. Mr. Hume's idea of greater publicity for the Association certainly is a good one. He said that probably half the people of the state did not know that there was a society of this kind in existence. I think he might have said that 90 per cent. of the people of the state do not know of the existence of the Florida Horticultural Society.

The Florida Horticultural Society is better known in other states than it is in Florida. Our proceedings are sought by horticulturists all over the country, all over the world, and the published proceedings are probably as much known outside of Florida as they are in Florida. The fact is, the proceedings of the Florida Horticultural Society are looked upon as classics; the very best information upon Florida horticulture, and particularly citrus horticulture, is found in the reports of this society. Men who are capable, scientific and intelligent, have given freely of their information to enrich its pages.

Citrus culture, as we know, is the most important of all the horticultural and agricultural industries of the state. A larger amount of money comes into the state from our citrus fruits than from any other single source of agricultural endeavor. It is double, treble the value of our cotton crop, and it is exceeded in value only by the turpentine industry which, unfortunately, will soon be a thing of the past.

The advice for the Association not to go into politics certainly is good advice. We are not a political organization. The members are of different political beliefs, but we are all Florid-

ians, and we are all entitled to recognition by the state authorities, the legislative and the executive officers, and I believe that the Florida legislature will meet you half way in any reasonable request on the part of this Association. I have had considerable experience with various Florida legislatures, and I have never made a reasonable request, showing the necessity or the propriety of the request, but that it was readily granted. Frequently they trim me when I ask for more money than they think I ought to have. They cut down the request to a more reasonable amount, but, looking ahead to that possibility, I have generally made my estimates very ample.

I do not know of any request, particularly by the farmers, that would be ignored, and while I do not agree with Dr. Blackman that we are necessarily the "aristocrats" of the agricultural world, there is some truth in it, but still, horticulture is nothing but agriculture, and the same principles involved in one are involved in the other, and the same knowledge that applies to the culture of fruits applies equally to the culture of grains, also to stock raising and all agricultural work. Everything that comes from the ground, every crop that is raised, is covered by the same climatic conditions and other conditions.

I hope that a legislative committee may be appointed and, Mr. President, I would rather not be on that committee. I would rather work as a layman on the outside. You want men who will go to the legislature and spend a week or ten days educating the agricultural committee, which, I am sorry to say, is not an important committee, and generally made up of men who know very little about agriculture. Other committees are made up of men who are educated along that particular line. Unfortunately, we do not have many up-to-date farmers in the legislature. We have a number of orange growers, but they generally get upon the judiciary committee or some other committee, because they are also lawyers. We have had some who are orange growers, particularly from Volusia, Orange, Hillsboro and Lake counties; I need not mention their names; you know them.

The legislature has been more liberal in the last few years in its appropriations looking towards the betterment of agricultural conditions. They have made fairly liberal appropriations to our experiment station and to our experimental work; that is, our farmers' institutes, all of which are beneficial to the Florida Horticultural Society. I find that the legislature is a body of men very similar to this body of men. They are fairly representative of their community. They are necessarily very cautious, because they are subjected to a good deal of criticism, particularly by people who know nothing about what they have done. This is long range criticism, and they are taught to be cautious. But if a reliable, responsible committee can be appointed from the body of this Association to go to Tallahassee during the session of the legislature, staying a

short while, visiting the committee and talking to their own members, showing the importance of any request you may make for legislation, it will surely be granted.

As an instance, in the last few days of the legislature we desired a special charter to organize the Florida Citrus Exchange. A gentleman who was an attorney and formerly a member of the legislature, and who "knew the ropes," a large citrus grower, appeared there, and in two days that special charter was prepared and passed both houses. When the nursery bill was prepared, an orange grower, a member of this Society, and a nurseryman, came to Tallahassee, and inside of a week we had our present nursery bill, with a reasonable appropriation: a sufficient amount, together with the fees, to make it a very good bill. It now wants expansion; we want to add more authority to that nursery inspector who is acting under the Board of Control. That can be readily obtained, and gradually you can build up your inspection law into a horticultural law. You can never build a horticultural law by commencing at the ridge pole and building downward. You have to begin at the foundation and gradually expand as the demands necessitate it.

This question, which has been assigned to myself, has been a serious one, as we all know, during the last fifteen or twenty years. Prior to the time that our production averaged around 1,000,000 boxes, there was no question of the shipping of immature fruit. At that time we had only the old Florida seedling, which ripened in November or December and reached its excellence about Christmas time Varieties were practically unknown. But those varieties have multiplied. Their season of maturity has been extended from September on through until July. There are, as Mr. Hart and others know, some varieties that are mature and ready for shipment from the latter part or middle of September through all the months up to the first of July. We have the early and the late oranges. It is a question in my mind whether an orange ripening in June or July is really a late or an early one. It is an early one, so far as season is concerned; it is late because it grew a long time.

It has been my pleasure to attend most of the annual conventions of the Florida Horticultural Society during the past twenty years. The Florida Horticultural Society is practically a citrus growers' association. One, however, for instruction and consultation as to the best methods of producing the fruit, its care while in the hands of the producer, the best and most economical methods of culture and fertilizing, and the most desirable varieties.

I have attended several other conventions of citrus growers which had a different object in assembling, equally, if not more important than the art or science of producing the "best orange grown in the world;" that is, how can the production of oranges be made profitable? The problem of how to produce a perfect orange, the equal, if not the superior of

that grown anywhere else on the globe, has been solved by the Florida citrus grower. The problem now is how to dispose of the crop profitably to the producer, and to the satisfaction of the consumer.

This problem has vexed the grower sinec the early eighties, when the crop reached approximately 2,000,000 boxes. It was acute when the "old Orange Growers' Union" and the "Florida Fruit Exchange" were established. I participated in the formation of both of these organizations, the first effort to organize the citrus growers into a co-operative body for mutual protection.

The older members of this convention remember the conditions before this organization and what the immediate results were—that prices doubled to the grower within a year, though less than 25% of the growers joined the "Union" or supported the "Exchange."

Again, in Orlando, we organized the "Florida Fruit and Vegetable Growers' Union," in 1894, which was made useless by the freee of 1895.

We have now the "Florida Citrus Exchange" organized after much study and after having visited California and examined into the remarkably efficient and profitable results of the California organization. This will be handled by men more experienced and better fitted than I.

I will be pardoned, I hope, if I say, that from my knowledge and observation, my opinion is that the Florida Citrus Exchange has largely influenced the market —has raised the standard, educated the shipper or packer to the necessity of proper grading and sorting; to careful gathering, grading and preparation and packing of the crop.

Its influence upon the market has been beneficial to the entire industry. Its support by the orange growers will, in my opinion, result in great good to the industry as a whole. Its failure will result in great damage and demoralization. That co-operative marketing is necessary will not be denied by any one. While the management may or may not have been satisfactory to all individual members, the organization, however, is one of the best yet devised and in time will certainly become the leading factor in obtaining for the Florida orange grower a uniform and profitable market for his product.

That some such organization to steady the market, to prevent congestion at certain points without corresponding scarcity at others, is necessary, is apparent to all interested in the work. With an enormous crop now probable to be marketed in a short time, without some practical method of handling it as a whole, disaster is sure to result to a majority of the growers. This is no new problem, but one that has been presented to you before, and in each case, a co-operative organization was the result, steadying the market and improving prices. This is a matter of history. We should profit by former experience, and stand by the method that has produced beneficial results.

For years, since the introduction of varieties, early and late oranges, as distinguished from the "old Florida seedling," the superior of which, when mature, cannot be found, there has arisen a problem, on the proper solution of which largely

depends the financial success of the future orange production of Florida. I allude to the shipment of immature or unripe citrus fruit. For years this problem has vexed the grower—"When is an orange ripe?" Shall the grower sell his fruit as early as possible, though immature and unripe, for what it will bring, and avoid the risk of a loss by frost; or hold it until fully mature, at which time the shipment of immature acid fruit by others has disgusted the consumer, destroyed the demand, and slaughtered the market?

That the shipment of such immature acid fruit has largely destroyed the former reputation for excellence possessed by the Florida orange, will not be disputed by anyone familiar with the industry during the past twenty years.

That it is a serious menace to the industry at present, I believe, will be conceded.

A ripe Florida orange is probably the most desirable fruit known, only approached by a Florida pineapple ripened in the field, once partaken of, the desire is for more, and yet again. I have never known any one to be surfeited on ripe Florida oranges.

On the contrary, should one be so unfortunate as to attempt to eat an unripe orange, the experience would not knowingly be repeated, and for months the victim would hesitate to indulge in a fruit that would probably "set his teeth on edge" and prevent comfortable mastication for hours.

The problem, then, is how can this serious damage to the industry be prevented?

When shall an orange be shipped?

When is it mature?

What rule shall apply to the early orange, the seedling sweet orange, and the late orange? The late orange, as we all know, may ripen as early as March, and as late as July, the early varieties coming in in September and October. The "Florida Seedlings" reach their best development in December. When an orange is mature, therefore, depends largely on the variety.

The next problem is, what constitutes maturity? What shall be the relation or ratio of acid to sugar, in order to say that an orange is or is not mature? This, of course, will again depend on variety.

So far, no studies have been made as to the chemical composition of mature and immature oranges of different varieties. A very exhaustive analysis of nine characteristic varieties of oranges was made by Prof. H. K. Miller, of the Florida Experiment Station, in 1904, as reported in 1909, pages 30 to 33, in which the ratio of acid to sugar varied from 1 to 13.4 per cent, to 1 to 5.3 per cent, with an average of 1 to 9.4 per cent., for the series of nine varieties. These being mmature oranges, the average ratio could not be accepted for the various varieties.

The California Experiment Station, also the Chemical Division of the U. S. Department of Agriculture and the Chemical Division of the Florida Agricultural Department, have also made numerous analyses of oranges of various kinds. These analyses, however, were of mature fruits. So far, we have been unable to find any series of analyses of unripe fruit, hence no chemical standard has been fixed, by which the maturity of an orange, or a

variety of oranges, can be scientifically determined. A study covering a long period of time, several years of the various varieties during their ripening period, will be necessary to arrive at a standard for comparison. Again, a knowledge of the season, early or late, dry or wet, of fertilizing, of soil, culture, and other factors, will be necessary before a scientific or chemical standard can be fixed for the different varieties of citrus fruuits—the early and the late varieties. The problem presented is one for an expert, and not a scientist.

There are men familiar with the various varieties, their season of maturing, etc., men who know *how* to distinguish a ripe orange from an immature one, but who could not explain *why* they did so—orange buyers and a few expert growers. This is an art, not a science.

This problem is a serious one, one that must be met and decided right, in order to protect the honest shipper from the dishonest one and at the same time work no hardship upon the grower.

Remembering that the "rights of one citizen end where the rights of another begin," and that though the rights of the individual are necessarily subservient to those of the community, the individual has inherent right, particularly of property, that the laws of the land must respect.

That some standard must be fixed by law for the various varieties of oranges maturing at different seasons is obvious. Whether an arbitrary date shall be fixed for shipment of various varieties, or a ratio of acid to sugar for various kinds of oranges be fixed as a standard, is for you, gentlemen, whose interests are seriously menaced, to decide.

Expert orange buyers and a number of our orange growers can readily say positively that an orange is or is not mature, like the cotton classer, the tea taster, the butter buyer and many other expert or professional men. They know "when," but they do not know "why" an orange is or is not ripe. Its color may be green, its juices sweet and agreeable, and its flavor delicious. Again, its color may be bright orange, while its juices may be strongly acid, and its flavor decidedly unpleasant. This same orange, a few weeks later, would be in every way desirable.

The present law prohibits the shipment of immature citrus fruit and provides a penalty therefor. It does not define an immature orange, nor fix a standard for a mature orange. Like a number of our general statutes, it is vague and indefinite, leaving the jury to decide the question of fact. This applies not only to the immature fruit law, but also to other penal laws, making misdemeanors or crimes of certain actions, but failing to define properly what constitutes the misdemeanor. This problem is a serious one, and should be solved quickly, or the industry will continue to suffer.

There are wise men among you, practical men; also you can have the advice of capable attorneys and jurists, who can frame a law, fair to all parties concerned. One to prevent the injury of the industry generally by the selfish few, or by parties who have no permanent or real interest in the financial welfare of the Florida citrus growers.

Before closing this paper, it would be

unjust for me to fail to deny certain charges and attacks made by the officers of the Florida Citrus Exchange, reflecting upon the integrity and loyalty of the Agricultural Department toward the orange industry of Florida, probably the state's most important agricultural industry:

As far as my personal and official record is concerned, it is open to the citizens of Florida, and particularly the orange growers, who have known me intimately for thirty years; besides which, I am here, in the flesh ready and willing to defend any action of mine and leave the verdict to the orange growers of the state.

I, however, would be negligent of my duty towards the agricultural interests of the state, and to the reputation of one of our most efficient, conscientious and honorable public servants and my friend, did I not protest against any aspersions being cast upon the character and reputation of the late Commissioner of Agriculture, the Honorable B. E. McLin—a man the peer of any citizen of Florida, ntoed for his loyalty to her best interests, modest as a woman, fearful of doing wrong to anyone, positive in his defense of the right, prompt and careful in his official rulings, and courageous in the performance of his duty as an officer and as a man.

I have been intimately associated with the late B. E. McLin officially and personally for twelve years, and defy anyone to point to a single official or personal act of his not consistent with the highest moral and civic virtue, nor an instance wherein he was influenced by any man or set of men to allow himself in any way to do an injustice to any citizen individually, or to the community.

His patience under serious provocation and unjust criticism was proverbial, while his rulings were just and fair towards all, either friends or opponents.

I allude to numerous publications, particularly those in the Florida Grower, of March 23, and April 6, in which his actions officially are criticised by officers of the Florida Citrus Exchange, and particularly to the correspondence between Mr. McLin and the Florida Citrus Exchange, in which his wonderful patience and extreme courtesy as well as moral courage, are exemplified, much to his credit as a man and as an officer. In this correspondence Mr. McLin never forgot that he was a gentleman and an officer, and courteously replied to all communications, though in a number of instances they were not such as would entitle the writer to the courtesy demanded by one gentleman from another.

He was unjustly criticised as to his rulings on the immature fruit law, and accused of not being in sympathy with the effort to prevent this unholy traffic. No one better than myself knows that he was in full sympathy and accord with the effort to legally suppress the shipment of immature fruit.

He, however, was an administrative officer under bond, and sworn to administer the law, as he found it, not as he desired it, and above all, to do justice to all the citizens of the state, not only the Florida Citrus Exchange but the large number of orange growers not members of the Exchange.

None but his immediate official family and assistants know of the many problems presented to him under this law. The Florida Citrus Exchange saw but one side of the question. There were many other points of view.

More appeals were made to him to declare certain citrus fruit "mature and ready for shipment" by growers than by the Exchange to declare fruit "immature and unfit for consumption"—a duty by no means conferred upon the Agricultural Department. In both cases he would have been assuming authority not given to him by law.

In closing, I can only say that in the death of B. E. McLin, the state lost a valuable citizen, a courageous and upright officer, just to all, vindictive towards none, doing his duty to his state, and his fellow man. May his successor follow his example.

Seeking For Parasites of the "Whitefly" and Their Attempted Introduction Into Florida

R. S. Woglum
U. S. DEPARTMENT OF AGRICULTURE, WASHINGTON, D. C.

Mr. President, Ladies and Gentlemen:

For various reasons a number of the prominent orange growers in this state came to the belief some time ago that the whitefly pest of citrus fruit trees might possibly be attacked by natural enemies in its native home, if this could be discovered, and I expect an occasional man might have been found, who was so enthusiastic in his belief of the wonderful workings of nature as to have expected this severe pest to be held in check in some far off land by some undiscovered parasite. As a result of this agitation, demand was made on the Secretary of Agriculture by prominent representatives from this state, some or possibly all of whom are now present in this very audience, to initiate measures toward discovering the native home of the whitefly, and these demands resulted in an appropriation of $5,000 being set aside by Congress in 1910 for this purpose.

The speaker was asked by Dr. Howard, Chief of the Bureau of Entomology, of the United States Department of Agriculture to undertake this mission in search for the native home of the Florida whitefly and possible natural enemies. Rapidly drawing to a close, an investigation into the use of hydrocyanic acid gas in the destruction of scale insect pests in Southern California, I started for Washington preparatory to the trip. On the way eastward I happened to pass through San Francisco the very day on which George Compere, the famous collector of parasites for the State of California, was returning from the Orient with some supposedly valuable insects.

An examination of an orange tree which he had picked up in Southern Japan exhibited a heavy infestation of *Aleyrodes citri*. This naturally was of much interest to me, as it showed conclusively that this pest existed in Japan. We also knew that the pest was in south China as there are in the government collections at Washington, specimens of fly-infested orange leaves which were collected at Canton. There were also probabilities of its existence in India based on two different considerations. This knowledge led to the conclusion that our special efforts should be made in Oriental countries.

Encouragement toward success in ever discovering a true parasite of the whitefly might be said to have been at low tide previous to my departure from this country. Both Dr. Howard, Chief of the Bureau of Entomology, our greatest

authority on Insect parasitism, and Prof. Quaintance, a former Entomologist of this state, and the world's authority on *Aleyrodidae,* the group of insects to which the citrus whitefly belongs, did not believe, for various reasons, that a true internal parasite of the citrus whitefly was in existence. Closely following knowledge of this belief and almost on the eve of my departure I was shown a communication to the Bureau of Entomology, the embodyment of a resolution from this very association deploring my being sent on this mission, and advising that others more competent be sent in my stead. I am unable to say that this rebuke of my character and qualifications did not leave some flavor of resentment throughout those remaining hours preceding my departure, but gentlemen, I decided then and there that despite your lack of confidence I would fulfill my obligations to my appointed position as I then saw it, and carry out a diligent search of the citrus trees of the world for evidence of parasitized whitefly; that I would find parasites of this pest if they could be found and transport them to this state in a living condition if possible.

Leaving New York in July, we soon reached Gibraltar thence proceeding to Spain. A short time was spent in that country demonstrating before the Spanish Government the effciency of fumigation with hydrocyanic acid gas against various scale insects injurious to their orange trees and against which they had been very unsuccessful with various control measures previously tested. Search was also made for the whitefly, but without result. Italy and Sicily were also examined but these countries also were found to be free of the whitefly.

From Southern Europe the journey was continued to Ceylon, but without results. Crossing from Ceylon early in October, 1910, I landed at the southernmost seaport of the Indian peninsula. Although the voyage between Ceylon and India had been of such character as to cause me involuntarily to forget Entomology and instead make a close study of the special food of fishes, the piercing hot sun with which we were greeted on the morning of our arrival soon revived the dormant sensibilities and led me to suspect that surely this must prove to be the promised land.

The first three days in India were spent on railways in an endeavor to reach Calcutta, the former Capitol. My object in visiting Calcutta was to acquire all possible information as to the distribution of citrus trees in India. Being the seat of the government, the largest city, and having very much the greatest white population of any city in India it also is the headquarters of those men considerably acquainted with agricultural conditions in different parts of the Empire. Interviews were held with such men as were available, but with the result of securing little definite information on distribution of citrus trees. It must be remembered that agriculture in India is in a very primitive condition. Commercial fruit growing does not exist, but the production of fruits is almost exclusively confined to small patches of trees in yards, native gardens, and the like. However, occasionally one finds a plantation of trees anywhere from one to, in extreme in-

stance, about ten acres in size. These latter are very excceptional.

I examined all orange leaves to be found in the collections of the different museums in Calcutta and in one I was fortunate enough to find specimens infested with the Florida whitefly, as the locality of collection was mentioned, it presented a definite clue to the presence of whitefly in India.

The greatest aid to me in my work was the distribution of several so-called Botanical gardens, or we may say government nurseries in different parts of this country and most of these had an Englishman in charge. At Saharanpur in North India is located the largest and oldest garden in all upper India. Being informed that orange trees were grown in this garden I immediately made my way northward from Calcutta, arriving at Saharanpur the first of November. A delightful and accommodating English official of twenty-five years experience in different parts of India was found in charge, and to that gentleman I am deeply indebted for assistance rendered in many ways during my trials in that trying country.

An examination of citrus trees at this place revealed the presence of the whitefly. Although found on most trees the attack was so light as to produce no real injury. Continued search of infested trees resulted in discovering the larvae and adults of a small reddish colored ladybeetle feeding upon this pest. Naturally this was a most happy experience for not only had we found infestation of the fly, but also it was shown conclusively that the pest was attacked by a natural enemy. Several days were spent in collecting all of these beetles that could be found at that time. They were shipped in two different packages to this country; one in a specially made box sent by mail, the other to the American Consul-General in Calcutta, who gave it to the direct care of a ship-captain sailing between Calcutta and New York. All specimens in these two sendings were dead on arrival in Washington. The insect was identified by Dr. Schwarz of the U. S. National Museum as *Cryptognatha flavescens motsch.*

From Saharanpur, I proceeded northward into a Province called the Punjab, which adjoins the Himalayas and contains some of the most wonderful irrigation systems constructed by the English in India. Some of their canals much resemble rivers. This irrigation has resulted in making the Punjab the richest agricultural province in all India. The irrigated land is split up into small parcels for the natives whose crops being large and regular have made many very rich. An English official in the Indian Service once told me that the condition of being surrounded by suddenly acquired and unusual riches had produced such an effect upon these toilers of the soil that many had taken to drink! As a result the amount of whiskey consumed during the past few days in the Province had increased so enormously that the government was considering placing prohibition on its importation!

Lahore, in the Punjab, is the seat of a Botanical Garden and government nursery. Orange trees are extensively grown for hedges and shade trees; in fact more

citrus trees are found in and about Lahore than any other one place in India. Several days were spent here in a careful examination which not only resulted in finding the "fly" to be generally distributed, but also soon led to the discovery that a true internal parasite was attacking it. This was determined by the presence of small round holes in the top of pupa cases of the fly and the very nature of these holes as well as the distorted condition of the case itself showed conclusively that a true internal parasite had been present. A large number of leaves containing parasitized pupae cases were mailed to Dr. Howard, who found among the material several dead specimens of the parasite which proved to be an entirely new species and was named *Prospaltella lahorensis,* in honor of the city where first discovered.

No living species of the parasite could be found on the trees at this time of the year as the weather was very cool at nights, it now being the middle of November. In fact, practically all insect life was in a dormant condition even as it is here in Florida during the winter, for the night-temperature at Lahore during this time fell to between 40 and 50 degrees F.

Since the season had so far advanced, that insect life was in a dormant condition there was no possibility of securing living material for shipment to America before the following spring. This led to the decision that this cold season could best be spent in determining the distribution of the whitefly in India, and other Asiatic countries, and with this in mind I spent the remainder of 1910 in a search through India for this pest, and for evidence of its natural enemies. It was thought that with knowledge of the complete situation we would be in a position to know where and when to strike whereby to secure the greatest possible results in the shortest time. Although our success in India to this time had been great and immediate, who could prophesy that broader knowledge of distribution might not lend clues to even more extended possibilities of success?

My subsequent travels in India took me to practically all sections with the exception of the lower peninsula. As extremes of territory covered I might state that I have examined orange trees at Poona, on the west central part of the Indian peninsula; at Nagpur, in the Central Provinces, where the most famous oranges of all India are produced; at Peshawur, the frontier city in the northwest, at the entrance of the famous Khaiber pass, opening through the Himalayas to the northward and through which the Clans from Central Asia, pouring down and intermingling with those of India, produces such a dangerous rabble that a force of more than 2,000 policemen is at times inadequate to keep order in a town of about 50,000 people; at Dehradun, where the holy waters of the Ganges gush forth from the mountains on its thousand mile course to the Sea; in the lower valley of the Himalayas in a province called Sikkim, where one is about a hundred miles from the snow capped Mt. Everest, the highest mountain in the world, and on the shortest route to Lhassa, the most holy city of Chinese Thibet; and in the Khasia Hills of

Assam, where oranges grow in a wild state among the trees of the forest, and which contain the rainiest spot in the world. At Cherra Poonjee, the average annual rainfall is 600 inches. On the first of July, last year, 27 inches fell in twenty-four hours. Beyond these hills, it would seem from information available that oranges are to be found growing wild in a more or less uninterrupted state to the great citrus region of South China. The region almost immediately north and east of the Khasia Hills, between Assam and China, is a dense wild and unexplored region populated by uncivilized tribes. At present the British has an expedition in these wilds effecting punishment for the treacherous slaughter of two Englishmen while on a trip of exploration. A great many localities within these different limits of distribution were also examined for the whitefly. Orange trees were found to be in almost all parts of this great extent of country and practically all places in which citrus is grown there also was found the "fly." It may be safely said, that the whitefly occurs throughout India south of the Himalaya mountains. Evidences of parasitism were found in most places where "fly" was seen.

Late in December I left India and the next two months were spent in continuing the search in other oriental countries, namely Burma, The Malay States, Java, China and the Philippine Islands. Of all these places evidences of the pest was seen alone in China.

Meanwhile I had received instructions to return to India and was on the eve of returning so as to be on hand before warm weather appeared in the upper country, when unfortunately a sudden attack of appendicitis confined me to the hospital in Manilla for several weeks, a serious delay, for even hasten as I did from the hospital before fully recovered I was unable to reach upper India until the first of May.

Lahore in the Punjah was made head quarters of my endeavors as a more infestation of whitefly had been seen here the previous year than elsewhere. Also young nursery trees were available, an important consideration, for very few had been seen elsewhere in India during my extensive travels. I am aware that to you growers of Florida, it is almost inconceivable to understand how the whitefly could be universally present throughout a country almost 2,000 miles in length and of equal breadth, and yet be so scarce that very few living insects occur on any one tree. But this was the condition which I had found in India with one or two exceptions and these exceptions were in the vicinity of Lahore. On my arrival May 1st, at Lahore all these previous infestations were carefully examined, but very few living insects were to be found. A very careful search of this region was continued and within a few days I had discovered a very dense hedge of orange trees, which was quite severely infested with the whitefly; in fact, with the possible exception of one other tree it was the only severe infestation seen in all India. Overshadowed by dense deciduous trees these afforded decided protection from the hot summer sun. There is no doubt that good fortune favored me in discovering that hedge, which afterward proved a bonanza for my efforts. An examin-

ation of this hedge showed that the first brood of "fly" had already appeared, oviposited and disappeared. The insects were in the egg and first larval stages, principally the latter. A few living *Purpeltella lahorensis,* the parasite, were soon found, also a number of the predatory lady-beetles. This encouragement over finding of living material of two natural enemies of the whitefly partly compensated for the disappointment of arriving after the first brood of "fly" had emerged. Had I arrived a month earlier as intended or before the first brood had appeared, it doubtless would have enabled me to leave fully four or five months earlier than was the case, and have reached Florida during August.

The reasons of this conclusion were as follows: In order to successfully transport a parasite or lady-beetle such a great distance as from India here, it is necessary that they have living whitefly for food all the way. The only practicable method of doing this is to bring the parasite in cases containing young infested trees. As whitefly infested nursery stock does not exist in that country it was first necessary to secure the trees and infest them artificially. This can only be done while the adult fly is in flight. The brood having appeared previous to my arrival it was necessary to await the next brood.

As no insects can endure the high temperature of the direct sunshine in India I constructed a canvas cover over the greater part of the orange hedge so as to run as little risk as possible in this respect.

Next, a large number of young nursery trees were secured and placed in earthenware pots. It was soon found, however, that no sooner did young growth commence to appear on these plants than it was destroyed by an orange leaf-mining insect and also a bud-worm, which ate into the buds. So serious were these pests that all new growth was destroyed as soon as it appeared, and as tender growth was required for whitefly infestation we were for a time greatly worried over the outcome. As a last resort we constructed a large cheese-cloth house under the shade of an enormous mulberry tree and by daily hand picking and destroying the pests as they appeared, we soon freed our trees and secured a satisfactory young growth.

The fly rapidly increased in size on the hedge plants, and by the end of the first week in June were in the almost matured pupa form, while our hopes ran high with the soon possible infestation of our young trees. The weather, however, at this time had become piercingly hot and dry. Normally, June, July and August are the months when the heavy monsoon rains drench India from the mountains to the sea and insect life springs up in great prolificness. These rains were very late in appearing in the summer of 1911 and then almost completely failed in the Punjab province. The result was semi-arid conditions, except where irrigation water was available. The terrific heat of this section when the daily temperature in the shade averaged between 110 and 120 degrees F. and in the direct sunlight 160 or above, and is accompanied by frequent hot blasting winds so checked insect act-

ivity that scarcely any more active insects could be found during these hot months than are seen in Florida during the winter. The whitefly on the orange hedge at Lahore, which were almost matured pupae the first part of June, were so completely checked in development that they remained dormant throughout the summer. Great numbers were destroyed by the heat and for several weeks it looked as if my mission must surely end in disaster. Throughout this period the lady-beetle had entirely disappeared.

Fortunately, in the latter part of August the rains finally broke, dissipating the intense dry heat which was succeeded by a moist one. Within ten days after the first appearance of this moist period, the adult flies were emerging in great numbers.

Our potted plants, which by this time were well covered with young foliage were placed on platforms along the orange hedge, and by the middle of September were well infested with whitefly eggs. In due time these hatched and developed, some became parasitized and thus were ready for transportation to America. About the same time the lady-beetles began to appear in numbers on the orange hedge. Six specially designed cases which already had been made were packed with potted trees, and with three containing parasites and three lady-beetles, the return trip to America was commenced.

I left Lahore with my valuable charge on Oct. 22, 1911, sailing from Bombay 28th of the same month. Vessels were changed at Port Said and Naples, arriving in New York Nov. 28, after 16 months absence during which eight different countries had been visited in search of the whitefly. Its distribution in the Northern hemisphere had been pretty definitely settled, and two natural enemies of the pest discovered. Incidentally, it might be added that a few experiences and even hardships had been undergone during this extended trip.

This material was landed in Orlando, Florida, Dec. 2nd, 1911, in splendid condition. Twenty-eight lady-birds, active and healthy, were immediately removed from the cases and also some parasites. A large number of living parasites in the pupa as well as in the adult state remained in the cases.

This is the story of my efforts abroad and the conditions in which these natural enemies were landed in Florida. As I had been engaged to search the world for the whitefly and possible natural enemies, and if found, to attempt to return with same to this state, I felt that in the accomplished results my obligation to my position had been fully fulfilled; that my work with whitefly parasites was at an end.

As you all well know Messrs. Yothers and Back had been carrying on the whitefly investigations in this state for a number of years and later Mr. Crossman was engaged. The resignation of all these agents during 1911 resulted in a temporary check to Florida investigations and also to preparation for the reception of the parasites on their arrival. My return in December was unfortunate, but unavoidable. Whitefly at this time is in a practically dormant state and largely con-

tinues in this condition during the winter months. As both the introduced natural enemies require active breeding insects for food it is quite probable that lack of this condition affected them fatally, for the slendid stock of living material has died since its arrival. The changeable weather of the past cold winter undoubtedly also produced injurious effects. But, whatever may have been the cause the bold fact is that all the introduced natural enemies of the whitefly have been destroyed, and it is needless to say that this condition is unfortunate. I personally feel the loss quite as much as you Florida orchardists.

I am speaking frankly with you on this matter as I know it to be a subject in which you are as vitally concerned as the Department of Agriculture, and, moreover, it has always been my policy in scientific work to at all times keep my endeavors and methods an open book to such as are at all interested.

Had a greenhouse been constructed in which breeding whitefly was available on my return and in which the natural enemies could have been liberated there is no question in my mind that we would now have an abundant supply of the ladybeetle enemy and possibly of the internal parasite as well. But, we all must learn by the hard road of experience even in Entomology as in your own profession, and agree with the old philosopher who said that "if our foresight was as good as our hindsight we would be a heap better off by a damned sight."

Now, gentlemen, you know the condition of the search for parasites and the present conditions as they actually exist. There are those among you who will say, "I thought so;" others "I never did believe in parasites,"—but, the more coutious and thoughtful will ask "What about it?" What further will we do, or will we let the matter drop as it is?" That, gentlemen, is for you to decide, but first let me make a few statements as I understand them after mature deliberation from my experience in practical insect work. Should there be anything of value in the same, then I am happy; if not, why, I feel safe in no particular harm resulting as I return to California next month to resume work on the control of orange tree pests in that state.

On the natural control of pests. I have heard some experts of authority state that these parasites which I discovered would never amount to anything; that they did not believe in them, and this, gentlemen, without any knowledge of what the nature of these enemies were, or what they were doing in India. Of course such an opinion is worth no more than the air necessary for its utterance. It is merely a prejudiced statement.

Possibly many of you believe that because I have been engaged on parasite work that I am an enthusiast on the subject and will boast that these natural enemies, if established in this state, would wipe the "fly" off the map. Let me state that I am enthusiastic on the subject of parasitism, but only to the extent of what a parasite will actually accomplish. There is not a single instance on record in which a parasite has eradicated a pest and only one where control of a commercial na-

ture has resulted from the action of a single natural enemy. There are numerous records in which the concerted action of several natural enemies has resulted in wonderful efficiency toward controlling a pest, and if I had the time I could recite to you scores of instances which have come under my personal observations during the past seven years, in which the efficiency of parasites has been of such meritorious nature as not to be ignored.

In general I believe in control of pests by mechanical means where practicable above all other methods and if I had a grove of my own infested with the pest either producing severe injury or liable to produce severe injury I would treat that grove at the proper time with the most approved mechanical treatement then known as applicable to my particular case. Do not await the action of natural enemies of unproved value. The commercial efficiency of certain practical treatments against the whitefly is well known and a known factor should have preference over one of unproved value, especially where the latter is of a nature seldom commercially efficient.

At the same time, it is good business policy to give an unknown quantity a chance, where this can be done with no trouble, danger or expense. If a natural enemy establishes only a partial control it is of considerable benefit even to the man with his mechanical methods of control. Let us suppose the efficiency of a parasite is fifty per cent, which is far below commercial requirements. A tree containing a million living insect pests will suffer more than one with half that number. Then, at best, mechanical methods never eradicate and after treatment is it not better to have five per cent more or less of 500,000 insects left on a tree rather than five per cent of a million.

In the case of the man who never treats, any destruction by parasites is net gain.

What have the natural enemies of whitefly accomplished in India? The whitefly in that country is not controlled by either. The great enemy of the fly in India is the excessive heat. The percentage of living whitefly destroyed by the internal parasite is very small; scarcely noticeable. The lady-beetle is very much more efficient than the parasite. It breeds rapidly and consumes large numbers of the "fly." As it feeds only on the eggs and larvae the period of food supply is limited and its total efficiency no great per cent.

What may we expect from these natural enemies if successfully introduced into Florida? I will tell you:

At the very maximum of possible efficiency I believe they would fall short of commercially controlling the "fly" throughout this state. I do not believe the commercial control of fly by natural enemies alone is possible. However, even though absolute commercial control could not be expected, my observations and experience lead me to believe that the introduction of these natural enemies, especially the lady-beetle, is likely to result in sufficient beneficial results to be well worth the while. Especially would this be so when working in connection with the different fungus enemies now found

in this state. In brief, you all well know that the fungus enemies of the whitefly fall short of being absolute or universal in their control. Yet, how many of you present, do not consider these diseases to be of great value to the state. The insect enemies of the whitefly should be placed on comparable grounds with the fungi.

I found the brown fungus at one place in India, but its efficiency was inconsiderate. Why? Because the climate of the Indian plain is too hot and dry for fungus development, and these very elements which keep down the fungus in India are in my opinion largely the same that keep down the insect enemies of the "fly" as well. Probably the adult parasites never emerge from the majority of parasitized larvae and pupae of the "fly" and this because of their destruction by heat previous to their exit. This same weather which limits the whitefly to two distinct broods has both an indirect as well as a direct effect on the lady-beetle. Since this insect destroys only the younger stages of the fly the indirect effect of the heat is that limiting the breeding of the fly to two distinct broods, there is only a very short time in the spring and in the fall during which food for the lady-beetle is available. The direct effect is that the extreme heat produces a deterrent influence on the activity of the predatory enemy of the whitefly.

The elimination in this State of these natural checks to parasite development which exist in India, in that here we have a larger number of broods of fly on the citrus trees and also a number of other plants on which the fly breeds freely, results in an adequate food supply during the larger part of the year. And here also, the most extreme day of summer is sufficiently mild to allow free activity of this lady-beetle. With such favorable conditions over those of the Orient it would seem safe to prophesy that the efficiency of these natural enemies would be greatly increased.

I will cite you the one most extreme instance of the efficiency of this lady-beetle in India. I had placed something like 30 potted orange trees severely infested with whitefly beside the aforementioned orange hedge, and under the shade of a large lime tree. They were thus placed in order to secure infestation with parasites. I carefully examined these trees one day, finding one adult lady-beetle and a half dozen of its larvae present. After an absence of about ten days, a second examination was made and you can imagine my surprise at the situation that on these trees where previously a half dozen beetle-larvae had been, now there were scores of them; also numerous beetles. So much of the fly on these trees had been destroyed in this short while that what was left was useless for parasitic stock. This example shows what the lady-beetle will do when the food supply is ample. How do we know but if introduced to Florida it might act with equal efficiency over great areas?

I have attempted in this communication to state the situation exactly as it has appeared to me. I do not believe you can say that my statements have been extreme. The natural enemies from India are all dead. From what has been

stated you have enough facts on the subject to decide whether or not another expedition should be made to bring over the lady-beetle. The question is one alone of interest to you citrus growers and one you must decide for yourselves.

DISCUSSION

Mr. Skinner: I don't know just how to begin. I am mortified. I was at Orlando when that resolution was passed. I opposed it. I opposed it with all of the energy I possessed. I am ashamed—ashamed of the Society. They insulted that man. Once before I had seen one of these men insulted, and it is a disgrace. I move that we rescind that resolution with all of the force we have.

Mr. Wakelin: I second that motion.

Mr. Hume: It has been moved and seconded that the motion which was passed at Orlando be rescinded. I need not repeat the gist of it; you are all as well acquainted with it as I am.

Mr. Hart: I think it would be very well to have a little better understanding of what it is. We want to know what we are doing. I think it would be better if we all understood. Not but what I think it would be well to rescind it, however.

Mr. Hume: Do you want me to read the resolution?

Mr. Hart: I would like to have the resolution read at this time, and move that it be read, now.

Mr. Hume: You are out of order, Mr. Hart; there is a motion already seconded before the house.

Mr. Hart: I ask for a personal privilege, with Mr. Skinner's consent. May I have it, Mr. Skinner?

Mr. Skinner: I think you have enough information from the paper itself to know what the resolution was, and I believe that the least we can do is to rescind it without any further argument.

Capt. Rose: I think that the whole proceeding is out of order. A motion has been made and seconded to rescind a certain unknown resolution passed at a previous date at Orlando, at which meeting many of us were not present. I want to know what the resolution was.

Mr. Hume: The only way the chair can get around this difficulty is to put the motion now. If you want to turn it down, you can do so.

Capt. Rose: I am as anxious to rescind any resolution which is unjust as Mr. Skinner. But before we vote on it, I claim that the resolution should be read.

Mr. Hume: It has been moved and seconded that the resolution as passed at Orlando be rescinded. Are you ready for the question? (Cries of "Question.") Those in favor of the motion as made will signify by saying "aye." Those opposed "no." (Motion lost.)

Capt. Rose: Now, I move that the resolution that was passed at Orlando be read and that the resolution be rescinded by this body. (Motion seconded and carried.)

Hume: The resolution as recorded on page 99 of 1910 report is as follows:

"Mr. Temple: I move that the secre-

tary of the Florida State Horticultural Society be instructed to communicate with the Department of Agriculture and the proper bureau, suggesting to them the appointment of Drs. Berger and Back of Florida, as men to take up this investigation of the origin and natural enemy of the white fly. Seconded by Mr. Henderson."

Mr. Skinner: I do not want to bring this up too much, but I have followed this investigation and search for insects, closely from the start. I think the resolution as it was read, was modified, for which I am thankful; that is, it is not exactly in the form in which it was offered.

I have nothing but respect for any of the Government men. They are the finest class of men in this United States anywhere. (Applause) They will not have one that is not that way. If they find a yellow streak in him, they kick him out. I felt so deeply the action of the Society at the time, that it would react on us (I cannot say this is a judgment of Providence on us) that I feel it is no more than we deserve. He did his work well, and see what he was up against and, I tell you, gentlemen, there is a *man*. There is a man that the Government ought to be proud of. This case of insects that he brought from India is the greatest thing in the line of whitefly extermination that has ever been accomplished. There has never been anything done equal to it; there is no question about that. And how were we in Florida, prepared to do our part. After we had been urged by Prof. Howard to have our preparations ready to receive them, how were we prepared to co-operate? Not a thing was done! I say, the next time we want to be sure we have the right man in India, and the right man at home.

Prof. Yothers: Mr. President, I do not like to be attacked as I have been in the last minute.

Mr. Skinner: I was not attacking you in any way, shape or form.

Prof. Yothers: You *did* attack me, just the same. Now, I want to say something first. I did not resign my position until the first day of August. During the month of July I made elaborate preparations for the reception of these insects. As soon as I found out Mr. Woglum had sent some insects, I immediately made the preparations. I planted out a nursery of sour seedlings which were heavily infested with whitefly. Not only did I do this, but I sprayed them with Bordeaux to kill out the fungus parasites which were on the trees at that time. Had those insects come in July, or August, or September, as they were expected to arrive, the preparations as they were made would have been ample. No power in the world could have kept those conditions unchanged until the time when they did arrive.

I do not like the idea of being accused before a body of this kind that I resigned under fire; that I resigned when there were no preparations made to receive the insects.

Mr. Skinner: I did not mean to reflect upon you in any way, Mr. Yothers, because you are a good friend of mine. I did not mean you to take it to yourself at all.

Prof. Woglum: I want to heartily praise what Mr. Yothers did. I know that his resignation had nothing to do with the matter under discussion. He had done everything in his power to make preparations for the parasites. He resigned for other reasons, but this left the preparations for the parasites at that time at a standstill, although everything at that time had been done, as he said, up to August or September. Another man from the north was sent down to carry on this work which Prof. Yothers had so carefully begun, a man who knew nothing of the real conditions. Mr. Yothers was not to blame.

It is true some other localities might have been found where the conditions would have been right at the time the insects were received: Miami, or Key West, but, as I understand it, the whitefly does not occur here; therefore, I did not think it was wise to bring these insects to a country in which whitefly did not occur. They might bring calamity with them for the growers who are free from the pest.

Mr. Yothers is not to blame; nobody is to blame. It was simply one of those unfortunate chains of circumstances leading to an unhappy result.

Mr. Hartmann: Haven't we succeeded in thoroughly muddling the situation? It looks to me as though the Society voted last year on a proposition whether or not they could enter a better man to make this investigation than the man they did send, and the wisdom of the Society at that time decided that they could do better. Now, maybe they were right, and maybe they were wrong. Now, Mr. Woglum may have done excellent service, but that, in my opinion, does not call for the Society's revoking its resolution. The Society can, in my mind, if they see fit, tender a vote of thanks for the work done, but it is quite a different proposition from saying whether or not the Society could have done better at the time. By that, I mean no reflection on Mr. Woglum.

Mr. Kilgore: I remember the discussion at Orlando, quite well. It was brought about by a situation that did not affect Mr. Woglum in any way. You will remember that we secured an appropriation of $10,000, and we were willing to contribute to this fund, an equal amount. This appropriation was cut down arbitrarily, after our Senators had secured it for us, and Mr. Woglum, a stranger to us, was given the position. In getting through the appropriation, we had a man in view. Remember, we had taken the initiative in this movement, and when, without our knowledge or consent, the appropriation was cut squarely in half, and a man appointed without consulting with us, it put us a little on the ragged edge. Mr. Woglum was not the cause of all this trouble.

That $5,000 was well spent. I do not think that the resolution was out of order, as passed last year, but I think a vote of thanks to Mr. Woglum should be passed at this session.

Mr. Hubbard: I move Capt. Rose's motion be laid on the table.

Mr. Skinner: We are at the parting of the ways of this Society. The choice of men to carry out this work was given

to Prof. Howard. It was presumed that Prof. Howard knew all of his men and would know the man to choose to do this investigating, and when this Society passed that resolution, it passed a resolution that it had no business to, and I say that they ought to rescind it. It ought to be taken from the records, because we want the co-operation of Prof. Howard and all of his men, and it is a reflection on Prof. Howard's judgment. I move that the resolution be voted.

Capt. Rose: I still believe, and I did at the time, that an injustice was being done to one of our energetic, enthusiastic young men; I did not know him personally. That resolution reflected upon neither his integrity nor his skill. I think it was harsh and cruel, and that the Society, in justice to itself, to the scientific interests that are being developed for us and other scientific bodies, should not permit to stand such an injustice of the kind that was perpetrated on that occasion.

Mr. Gillette: This discussion awakens some memories in my mind. You all recollect, perhaps, at least the older members do, that for some time we tried to raise a fund among the orange growers to send a man to India or some foreign country where the whitefly is known, to look for the natural enemies. You will also recollect that we failed ignominiously in raising that fund. It was finally decided that if we got the services of anybody, the expenses would have to be paid by the government. I recollect that the matter was called to my attention—I have forgotten by whom—at the time I was General Manager of the Citrus Exchange, that the Senate Appropriation Bill was about to go before the Seante, and if we expected to raise a fund for this purpose, it would have to be attended to promptly. I immediately wired Taliaferro, Fletcher, Sparkman and Clark, and took it up vigorously, because we had only a few days. These gentlemen all acted promptly and I had a wire from Senator Fletcher stating that the Committee had inserted an appropriation of $10,000 for the purpose of finding the natural enemy of the whitefly. It afterwards developed that Prof. Howard went before the Committee and stated that that amount was more than was needed, and that an appropriation of $5,000 was all that was necessary. At the time of the meeting, when this resolution was passed, this matter was all brought out and the discussion took place as to who should go to search for this enemy of the whitefly. Those of you who were there at the time, will recollect we had quite a heated discussion, and there was language used which is not in print in regard to the qualifications of certain scientists who might be sent there.

I did not know of Prof. Woglum; had never heard of him except through the correspondence I had had with Prof. Howard, but I did meet a former scientist who is connected with the work in this state—a man whom we all know and love, Prof. Tenny. I asked him about Mr. Woglum and he told me he was qualified for the work, and that if he was sent he would do all that any man could do to perform the service.

I contended at the time this resolution

was passed, that inasmuch as the growers themselves had not taken enough interest to put up the money, and the government had come forward and furnished the means, they certainly had a right to choose their man. If I pay for anything, I propose to say who shall carry out my orders, and I contended then, and I contend now, that the government ought to have furnished the man, as they paid the man. I contend that Mr. Howard knows his men; we have a good many here in the state, and Prof. Howard ought to know who the best men are. It seems that he did know, because he, no doubt, sent a man who did the work satisfactorily and scientifically; a man who put in his time in that terrific heat, and did what he did, deserves the thanks of this Society. It seems to me that we butted into the game where we had no right to be. In my opinion, the resolution is proper and it ought to go through, and I believe the members of this Society will stand by it. It reflects on us and we ought not to allow anything of that kind to stand.

Mr. Kilgore: I think the money the government spent, was ours as much as the government's, and that the motion to lay the motion on the table is in order.

Mr. Hume: Let me get this straight. We have the motion made by Capt. Rose, and seconded by someone else, that we rescind the resolution passed at our Orlando meeting. It has now been moved by Mr. Hubbard and seconded, I believe, that this motion be laid on the table.

Mr. Hubbard: If the majority wishes to vote on Capt. Rose's motion, I will withdraw mine.

Mr. Hume: That leaves the matter, in any case, just where it was. Now I will put the motion before the house; it has been moved and seconded that the resolution passed at our Orlando meeting, be rescinded.

(Motion seconded and carried.)

Mr. Wakelin: I move that we render a hearty vote of thanks to Prof. Woglum for the work he has done, by a standing vote.

Mr. Burton: I wish to agree to what Mr. Wakelin has to say, and I think it is very unfortunate that circumstances are such that the work has come to naught. As a matter of fact, there is no enterprise undertaken where you have to blaze the trail, where you do not meet with more or less trouble. The work that has been done is really a long step toward success, and I think that this Society should pass a resolution; they should pass it in such terms that there is not going to be any further possibility of the question of the Department of Agriculture continuing the research. I think it would be a desirable thing to have Mr. Woglum go back to India and have the preparation so made in this state that when he returns, those bugs can be fed until they have live flies to feed upon. I think it is to be deplored that any criticism has been made of the Department.

Prof. Rolfs: I move and second Mr. Burton's motion, that the work be continued. Of course, no one expects to make all of the ends meet at first; to always come out all right, and the very fact that we have once failed, ought to renew us to greater courage and activity.

We need more predaceous and parasitic insects to keep down the whitefly, and the fact that we have failed before, will make us more cautious. I think, in the next effort, there will be nothing to complain of at this end of the line.

We want to do soemthing that will amount to something, and I second the motion that the work be continued vigorously and pressed right ahead. Let us not be too critical as to whether we get the credit or someone else gets it. What we want, is work done.

Mr. Hume: It has been moved and seconded that the Horticultural Society urge the continuance of this work.

(Motion carried).

Mr. Gillette: I would like to ask if that resolution included a request to the government to have Mr. Woglum go back. I think we ought to recognize his work to that extent.

Mr. Hume: If you will permit me, I will appoint a committee to draft a suitable resolution. I will appoint Messrs. Burton, Rolfs and Gillette.

Methods of Packing and Shipping Citrus Fruits

L. B. Skinner

Mr Hume: This subject of packing citrus fruits is somewhat time-worn and it is a very difficult matter to get a report from a committee that gives us something new and something to attract our attention. I think that has been accomplished in this case.

Mr. Skinner: I had a letter from Mr. Warner saying that he could not be present, and Mr. Burbank does not seem to be in the audience, so I suppose my paper will represent the whole committee.

In this connection I want to emphasize one thing, and that is, that a man who puts up a poor pack not only hurts himself, but he hurts the reputation of the Florida orange, he hurts the reputation of every man putting fruit into the market where he disposes of his poorly packed fruit. That is not the worst phase of it. If a buyer gets hold, in a single instance, of this poorly prepared fruit, he is going to turn, next time he is in the market, to other fruit. If much of this poor stuff goes to a market, that market is sooner or later going to be closed to us. We can obtain the result we want only by every man putting his fruit into the market in the shape it should go in. I think we ought to have a discussion about that, and a live one, too.

Mr. Sample: I would like to ask Mr Skinner about this withertip. I am not very familiar with it. That is, what is the evidence shown on the fruit?

Mr. Skinner: You had better visit that room where the citrus disease exhibit is, and spend an hour in it. There is some withertip fruit in there.

The first evidence on the fruit is the "tear stains," and once in a while you will see little brown spots on your June bloom oranges late in the season. But if you have a car of withertip fruit go to the market and come back to you, you will think all the oranges have smallpox.

Prof. Rolfs tells me we had some trouble with it early in the season and then it disappeared, and then about the first of February, the trees were ripe for it and it got in its work again. You have to fight against it, and be prepared for it all the time, so that it will not catch you napping. You can alawys tell its presence, first by the "tear-stains," and when you see these you had better get busy. I suppose every grove in the state has it, more or less.

Mr. Penny: How much bluestone do you use in the washing water?

Mr. Skinner: I don't remember exactly the amount now. I have it in my packing-house, written up in big letters on the wall. Mr. Ramsey knows; he can tell you the exact proportion.

Mr. Hart: I would like to ask Mr.

Skinner of what material his tank is made of—the tank in which he uses these preparations.

Mr. Skinner: The tanks are made of wood. I do not think the permanganate of potash, however, affects metal. The difficulty in using the permanganate of potash is that where you have whitefly and soot, and much dirt, the permanganate loses its strength and becomes worthless. Of course, it is all right if you renew it occasionally. I use permanganate on my grapefruit and bluestone on my oranges.

Mr. Derby: What would be the effect if your fruit was first washed and then put through the bluestone bath?

Mr. Skinner: I should think it would be better.

Mr. Derby: I should think it would be better to get the dirt off first. That would save your bath from getting so very dirty.

Prof. Rolfs: In connection with the washing of the fruit, I would say that the method just spoken of is one of the first arrangements designed for preventing anthracnose in transit. You understand that anthracnose may attack the fruit on the tree and infect the fruit before it is picked. In that case, all the after-washing will be that much time wasted. You cannot affect it after it has gone into the tissues.

We found in 1893 a great deal of anthracnose was affecting the lemon in the coloring bin and we perfected an arrangement where the ammoniacal solution of copper carbonate was sprayed onto the lemons after the washing was done. After they fell onto the drying rack, the spray came down upon them in four jets; wetting them thoroughly with the ammoniacal. We found that to be the most effective way of preventing the "in transit" infection.

Mr. President, Ladies and Gentlemen:

What is to be accomplished?

First—Freedom from decay.

Second—Attractiveness of the package.

How can these best be done, and not sacrifice either one to the other, or at least make it on a practical basis.

We know the dangers which so easily ruin our best efforts; they hang over us and lurk around us, all the way from the tree to the consumer; and mechanical injury, blue mold, stem end rot, withertip, and the warm, moist, still days, when not a leaf is stirring on the trees and hardly a breath of air in the packing house, unless we compel it—these are our main enemies.

Knowing these dangers, we have got to go to work and plan our campaign carefully, securing the best assistance possible.

MECHANICAL INJURIES

This danger is one that is within our control, depending on the care we are willing to exercise throughout this journey of the fruit from the tree to the box. Rest assured that extra care is its own reward, and carelessness is its own undoing.

The Government workers have demonstrated this conclusively to us, but it would seem as if they would have to keep

everlastingly at it, day in and day out—in the field and in the packing house.

Closely linked with the danger of mechanical injury is blue mold, and blue mold is most active on warm, moist, still days. Then the stem end rot, a new menace, and the withertip, a dangerous enemy of the grapefruit grower, should always be kept in mind, as they will get him if he "don't watch out."

Bearing in mind these dangers, we conclude we must have a method of packing that will handle the fruit without a drop, a blow, or even a rapid motion, that will injure the fruit, from field to house. From the standpoint of avoiding decay, one could pack the fruit right from the tree, but it is not practical.

Mr. Ramsey is a very particular man, condemning even the running of fruit on a runway at more than a snail's pace. I believe the fruit should not drop—that it should be handled by motions as slow as possible to attain the results aimed at.

WITHERTIP

Withertip is a trouble that may cause a great deal of injury to fruit in the house and in the box, and must be carefully guarded against. Unlike blue mold, it thrives in cold, damp places, such as cellars and moist, cold storage plants.

I remember talking with a prominent grower some years ago when he was packing his grapefruit. He was washing it, and packed up several cars and sent to Boston. By the time the first car had arrived he had packed several others. He recived a wire, that practically the entire shipment had gone bad, and the next car the same.

He said, "I shut down and sent for Prof. Rolfs." They began to investigate, and found that the trouble was caused by the withertip, that had been spread by the washing water to all the fruit shipped, from some that had it on the tree. They treated the water with bluestone, and the trouble was remedied by killing the spores.

This season the foreman in one of my houses failed to treat his tank of water with bluestone, at a cost to me of perhaps two thousand dollars, caused by withertip. Care costs a few pennies here and there, but carelessness and forgetfulness costs dollars and dollars.

The withertip attacks fruit even after it leaves the jobber and goes into cold storage. One packer tells me that two weeks after his fruit had gone into cold storage, brown spots developed and almost ruined the car. I think that Prof. Rolfs could give us some interesting talks on that.

By the way, in talking with Prof. Rolfs a few minutes ago, we were discussing the citrus exhibit which is in that little room, and I asked him why it was not possible to have the photographs printed in the form of a bulletin and gotten into the hands of the men who had our work to do, superintendents and managers. We cannot get our men who do the work to realize the danger. Prof. Rolfs said he was going to try to do it this year—get such a bulletin printed on paper about the size of this paper from which I am reading, have the photographs about full size. I asked him what the

expense would be and he said about $250. —he did not know whether the State of Florida could afford it. I told him I would be willing to pay my share of it, and knew every other packer would be willing to have it done, and without delay. I will say that, if necessary, I will be responsible for raising that $250 in an hour's time, because I think everyone realizes the necessity of having something like that in every packing house. I will personally stand responsible for $50. or $100. Prof. Rolfs had better get busy, and if this grand old state of ours cannot raise that $250, we can.

It is important, and not always easy to get men to *realize* the *imperative necessity of greatest care possible,* and NEVER TO LET UP ON IT.

Unfortunately, to get our attractive package, one that will sell—we must wash our fruit, at least all whitefly sections must do so, and to avoid decay we must have perfectly dry fruit to pack.

Washing has been a problem that has confronted us all, and several people think they have solved the problem satisfactorily. Preliminary to the washing machine there are at least two systems. One is a soaking tank, and the other is a rack with the water spraying on it as it rolls down an incline, or moves along on a belt or chain.

Personally I prefer the tank method, because I can more easily handle the fruit, and because I can treat the water with bluestone, and last, but not least, because I can pick out with unfailing accuracy, all the light fruit—the fruit without juice—as it floats up to the elevator. I would not be without this feature in a packing house for any money.

Several years ago, a prominent fruit man was getting big prices for his fruit; all his fruit in large markets—he led the market. I took the train and went to see *why*. I found a large portion of the secret was in his water tank, by means of which he was able to eliminate dry fruit and pack only heavy, juicy fruit. The light fruit was thrown away.

No man can tell whether a fruit is light or heavy, after he has been trying to do it for a couple of hours, but water does not get tired, and the law of gravitation is always on the job. The water in the tank should always be circulating.

From the tank the fruit should be taken up by an automatic elevator to the washing machine, and it should be an elevator that does not drop the fruit, but lets it roll away easily to the washer. From the washer—which should be one that cleans, but does not injure—it should go to a drip chain and thence to the dryer.

The dryer problem is *the* packing house problem that confronts us today. There is no trouble in drying fruit with power and heat, but to do it economically, and to do it in that dangerous, warm, moist, still weather, is another matter.

When the hygrometer shows that the air is 100 per cent moist, how are you going to get it to take up more water? There is only one way, and that is by heat. Supply heat, and you can dry them; and I believe that if fruit is dried dry—bone dry—it will carry well in moist weather, and that the danger of wither-

tip infection is much lessened.

Recent experiments with dryers show that the dryer that revolves the fruit all the time, is the very best possible arrangement. The difficulty we have been up against before has been that the fruit would dry on top, but not underneath. A dryer to be effective, I believe, should turn the fruit and blow air on it at the same time.

Also we must have capacity. The amount of air necessary to dry a car load of oranges would astound you.

I believe also, that this air that has been blown over the fruit should be carried out doors by a supplementary system of ventilators or exhaust fans, drawing new air into the house.

Having dried the fruit *dry,* then comes the matter of grading, and I believe a grading belt that turns the fruit will also be the coming grading belt. The grader can see at a glance defects that he would have to pick up an orange and turn it over to see, and failing, it would pass by.

The grading will be taken up by another committee.

All fruit should of course be wrapped, and with a twist, and with at least printed wraps on the top layer. The box should be the hoopless box, with a three inch cement coated staple to fasten the center of lid.

And lastly the box—the package—should be as attractive as it can be made with Brand and Grade well marked.

DISCUSSION

Mr. Stevens: Mr. Hart, as you are one of the committee on the "Uniform Grade known as the Florida State Horticultural Society Grade, can't you give us your report?

Mr. Hart: I think there is some little misunderstanding between the rest of the committee and myself. Mr. Skinner wrote to me, as he was chairman of the Committee and asked my ideas in regard to the matter, and I replied, giving him my ideas upon it. I had them fully in mind then, but let the matter drop, supposing it would be embodied in the report already given as a report along.

My main idea was this: That as fruit from different groves is of a different class entirely, and sometimes different sections of the same grove will produce different grades of fruit, some of it being of a fine grade and some being coarse, the same requirements will not fit all conditions. In grading the different classes of fruit, there is almost sure to be a great difference in the results. Coarse fruit will be graded low; I mean by that, that the fancy grade of the coarse fruit will be much below fancy grade of the finer class of fruit.

As a general thing, it is very difficult to teach the graders the method, and train their eyes so that this will not be the result.

Now, I suggested as the most feasible method of getting them down to a correct way of grading, to get their fruit all alike as far as may be possible, that photographs be taken of what should be classed as fancy fruit. It is graded into three grades, fancy, number one bright, and number two, make two or

three photographs of oranges of each class; then have these enlarged and have them framed and put in shape so that they can be posted in each packing-house. Then you have something to refer to. It seems to me that in that way you can come nearer to a uniform method of grading your fruit than any other way.

I have here photographs taken by Prof. Webber—or possibly by Prof. Hume—for illustrating matter for the Agricultural Department of Washington in their Year Book. You cannot all see this because it is small, but here are two photographs of two oranges of the fancy grade; one taken equatorially and the other facing the stem end. In that way, they are almost a perfect fruit. You cannot get perfect fruit, however, on a commercial scale, but you can approach it.

The second two oranges are the Number One grade, showing more or less of marks and blemishes. The third are the Number Two Brights, and are all of the marketable fruit below the Number One grade. The Fancies are really the finest of all and take a very fine class of fruit. The Number Twos are so badly marked you cannot class them as a middle grade, which is the Number One. Below that, of course, is the culls.

Now, by having the pictures made in colors, of good size, that could be posted in every packing-house, it seems to me it would illustrate the matter and bring it right before the eyes of all the growers in such form that it would give them a very correct idea of what constituted a fancy orange, of the middle grade, of Number One Bright, or whatever you call it, and the lowest grade, and what constitutes a cull.

In a letter to Mr. Skinner, I went into this matter more in detail and, perhaps, covered more ground, but I had so much on my mind of late in matters of considerable importance, that I am not this afternoon prepared to go into it further. I offer my remarks simply as a suggestion. It seems to me a practical one, if I may be allowed to say so, and one that comes nearer to bringing us all into line, if you have to have one system of grading. I leave it with you to discuss it or not, as you choose.

This is the only photograph I have, but I will leave it here on the desk and I hope it will not be destroyed nor lost.

UNIFORM GRADING OF FRUIT.

R. P. Burton

Mr. President, Ladies and Gentlemen:

I have not prepared any paper on this subject. I shall discuss it from a purely commercial point of view. The question of grades is one that has been in a constant state of evolution for a good many years. In former days in Florida, the general

system was a lack of system. It was brights, goldens and russets. There were but few packers in the state who realized the importance of properly preparing fruit for market. Some of these gentlemen are in the state to-day, but their ideas have been developed and now all the better class of growers have gradually settled upon what they consider the best system of grading.

I hope you will pardon me for referring to California, as that seems to be a very painful subject for some of our friends. There is a good deal, however, for which we should thank California, and I think she has taught us something in the grading line. Fifteen years ago, when I first became familiar with the California orange, their system was to grade a fancy, a choice and a standard, except in the choicest districts near Redlands, Highlands and the best groves of Riverside and High Grove, where they had an extra fancy, fancy, extra choice, choice and standard.

Their business is conducted on more precise lines than it is here; they are better organized. Although about 60 per cent. of their fruit is in the exchange, forty-five per cent. of the remainder is organized, and their principle is co-operation. What they call the independent associations ship all the way from a few hundred to a few thousand cars each.

After they had tried that system for a number of years, they found that the competition among themselves was so keen that except in those districts that I have mentioned, who grow a strictly fancy orange, the fancy grade was eliminated almost entirely. They put out what they called an extra choice, a choice and a standard. That applied to a very large section of the orange belt of California. There are localities, however, in California which produce a uniformly low grade orange. In those districts they never pack anything higher than a choice or standard. The trade has become accustomed to that standard of grading.

The Redlands and Highlands people put out what they call a fancy, now. When they were packing an extra fancy, fancy, choice and standard, a very small percentage went into their extra fancy brand, and as the competition became keener and the trade became more familiar with their brands and more discriminative, they finally resorted to what they called an orchard run fancy. That meant that the standards were taken out and the balance of the fruit was packed as an orchard run fancy. They found that by packing an orchard run fancy they could make the price 10 cents below the ordinary fancy where the extra choice or choice was taken out, and the average for a crop would net more money. It finally resolved itself into practically two grades: an extra choice and a choice. Their standard is really very little more than a cull.

In Florida, when the Exchange began business, we found that the old standard of bright, golden and russet was the bane of the packing house. You could not quote anyone a car of oranges with any degree of certainty

that the oranges when they got to the purchaser would be what you had sold him.

My observation has taught me that there is just as much individuality in packing oranges as there is in any other vocation. Every woman has her method of keeping her house. Every merchant has his method of conducting his business, every physician has his own peculiar way of handling cases; every lawyer has his own idea of conducting a law suit, every salesman has his own individual way of making sales, and it is a wise sales manager who will let his men alone to follow their own methods, so long as the desired results are obtained. It is not safe to lay down a hard and fast rule for a man to follow when he has a duty to perform.

I have known packing houses in California to establish a brand that was second to none. I know of one such house that had a good reputation throughout the east. I was handling their fruit in Boston and it gave splendid results. The next year when the season opened, there was a very marked falling off in that brand. It was disappointing to me, disappointing to the people who bought the fruit and to the people in California. We were not able that season to get within 10 to 15 cents a box for that brand what it should have brought, compared with other brands that had been in competition with it for a number of years. I was curious to know why. I went out to California, as I was shy about corresponding about such things. People are sometimes thin-skinned and take offence very easily when a criticism or anything of that kind is made in writing, when you can handle the matter amicably in a personal interview. I went out to California and talked to the manager. He said, "I will tell you what the whole trouble is. We had a Scotchman running this house and he simply made our brand. He is an elderly man, but I have seen him, time after time, go by a packer and make him take a box of oranges he had just finished, dump it out and re-pack it. One of our competitors who had been trying to reach the prices we were getting came to this man and offered to raise his pay $300 a year to go with him. Our directors did not think they could stand that raise, so they let him go. We have handled 500 cars of fruit this year, and have lost 10 to 15 cents a box right straight through."

That is about $45.00 a car, and when we gave them the figures on that, they decided to get that old Scotchman back if they had to pay him $1000.00 a year more. They did get him back, and the next year their brand was up again at the high figure it had been before they let him go. Then Mr. R. immediately employed this man, and he did not put twenty cars of oranges on the market until he had surpassed what the brand from the other house had been getting. The directors said they had an understudy of this Scotchman, who knew every move this old fellow made in packing, and they felt sure this understudy would put out

just as good a pack as he, the Scotchman, did. But try as hard as he could, the understudy did not succeed in getting out a solitary car in the shape that the Scotchman did.

I bring that out to emphasize the fact that any set of rules you may make will miscarry unless you have the man who can put them into execution and make the proper discrimination. It requires a well-developed sense to make a successful pack, just as it does in any other business.

All things go by comparison in the orange business. The groves of Florida are scattered over a wide area of country. I was interested in what Mr. Hart had to say on the subject, and in Mr. Hart's packing house the system is perfect; in Mr. Porcher's packing house the system is perfect, but you can't find many Harts in Florida, yon can't find many Porchers in Florida. Oranges that go into Mr. Hart's boxes are similar to other oranges in that community. Take oranges that grow at Rock Ledge in the various groves, and you will not find any two packs that stand alike in any one market. There is always a variance.

In dealing with this question as a state-wide proposition, you have to take into account that you are dealing with people of a very different type from Mr. Hart, and Edmund Day and Mr. Porcher. The great bulk of the fruit of this state is what you call a very ordinary grade. You can put twenty men into twenty different houses to grade oranges under the old system of brights, goldens and russets, and take a box each of their finished product and line them up side by side, and you will find twenty different grades, twenty different packs and twenty different-looking packages. It seems to me that it is one of the most difficult problems you have to solve, and I doubt exceedingly if you will ever solve it. The thing we have had to educate the Exchange growers to, more than any other one thing, is to take off their fruit from the trees and put it into boxes as it should be done, and any packing house man in this audience, who has had to go through season after season of trying to get his fruit put out as it should be, to establish a grade and maintain it, knows how difficult it is. If you are fortunate enough to have one man in that house who has perfected his grade and pack, and insists upon it, you will maintain a uniformity; but you may take any number of understudies of that man and you will not find any two of them putting out the same pack that man puts out.

If the grading and packing is done properly, it becomes an asset. The brands of the gentlemen I have referred to are valuable assets; just as much an asset as the groves they own. The individuality of those men is an asset to them, because the individuality made the brand.

The Exchange, recognizing these points, has been gradually working out the problem through its Associations. We have adopted and have been using the past season in a number of our houses, a system. We go on the old

premium color system; first grade is blue, second is red, third is yellow and the culls go blank. A great many of our associations use these colors: blue, red and yellow. They have no brands. That brings us down to the old proposition of brights, golden and russets. This was where they did not have time to adopt their brands and register them. We insist upon every Association registering its brands. If their brands are good, they don't want anyone encroaching on them. If they are bad, others should be protected against them.

One of the most successful is the Winter Park house, of which you have already heard. When they established that house, they started out with five grades. Mr. Temple talked with me about it, and I told him I did not see how they were going to make five grades out of oranges that had but two. I told him I did not think they had any fancy oranges to speak of, and that I thought they were going to an unnecessary expense in establishing a brand for a few boxes of fancies. The time and expense they would put on a few boxes of fancy fruit would be more than wasted. I believe the Florence Villa house started out with the five brands. Dr. Inman talked to me about it, and I told him it was impossible. You can't take the fruit you have there and make five grades out of it. It simply isn't there. California, when they got something strictly fancy, called it extra fancy. That did not seem consistent. "How," I asked, "when fancy is your grade, and you get an orange that comes up to the requirements of fancy, can you call it extra fancy? How are you going to discriminate between the extra fancy and fancy? It is impossible to keep the two grades separate, and if it is fancy, and you call it extra fancy, and then again call it fancy, you will create prejudice in the markets. You had better put what you call your extra fancy into your fancy and build up that grade." They finally worked it out on that basis—not because I suggested it but because it is the logical thing to do.

Mr. Temple also finally worked it out on that basis. He has his Angel brand, that is his blue. I do not think he has shipped more than two car loads in the last two years. He grades his second grade, the Bulldog, purely on texture. An orange must be a thin-skinned, smooth, heavy, juicy orange, and not more than one-half discolored. Anything that goes below that goes into the Camel or else it goes to the culls. An orange that may be perfectly bright, but is thick-skinned and rough, in the average packing house in Florida may be put into a bright, regardless of its quality inside. The mere fact of its being bright, in the eyes of the ordinary grower and packer, justifies putting it into the first grade, because it is a bright. As a matter of fact, under his system of grading, that orange may go into the cull pile. You know what success he has attained with his Bulldog and his Camel.

In the Tampa house, which is equally as successfully conducted, they have

two brands, and grade on the same system. In the Tavares house, they put out three grades and a plain. I think they carry it to excess. They ship many cars that will not have more than five, ten or fifteen boxes of the first grade. I think the "Triangle" (second grade) would be better off if they would run that small percentage into it and they would not lose money in the end.

As I see the grading question, it is purely a commercial proposition. There are, of course, exceptions. Mr. Hart can put his fruit in New York and can always get a price for it, because "Hart" is stamped all over it. There are a number of others I could name of the same class.

In my own Association, where we put out probably 10,000 boxes this season, we have but two brands. We have not adopted the plan of the Winter Park house, because I have not had time to go there and supervise it, but next winter we are going to put it in.

When a dealer inspects a car, or a box, of oranges, he judges it by the poorest orange in sight, not by the best. If he is offered a box with a lot of coarse, thick-skinned, rough oranges, although bright, showing that they are not uniform; oranges that he cannot offer to his best trade, he makes a mental calculation as to how much loss there is going to be in that box on account of that kind of stuff. He does not know whether 10 per cent. or 50 per cent. or 75 per cent. is of that kind of stock, whereas if the stock is all such as that of the Bulldog brand, there is nothing in question.

You must remember that you are selling to people just as critical as you are. When you go to buy your groceries, your dry goods, you look for the best you can get for your money, and they look upon a brand just as you do. If you send for a box of Royal Baking Powder, that is what you want. You don't want Rumford's. If you send for Octagon Soap, you are not going to be satisfied with some other soap that may be "just as heavy and just as good," and then again, may not be. If you want a yard of pure silk, you are not going to be satisfied with something that may have the warp or woof of cotton, for all you know. You don't know anything about the substituted goods; you *do* know about the other.

To bring the thing down to a finality, the only solution I can see to the grading question is to eliminate the question of fancy, choice, bright, goldens or russets, and describe what will constitute a certain grade and put it under your brand, and when you have done that, take any number of packing houses that you may select and let them establish that system and it will not be any time until you will see in the same market a variation in price on the same grade from a few cents to a considerable part of a dollar. I tell you, it is the individuality of the man behind the pack that will make the difference in price.

It may sound pessimistic, but I firmly believe that if you atempt to es-

tablish a society system of grading, it will not be many seasons until you will be ashamed to acknowledge that the Society endorsed it.

DISCUSSION

Mr. Hart: Yesterday I offered suggestions in regard to the grading in the effort to bring them down to uniformity for the whole state. Now, as to the grading of the fruit of the state as a whole, I hardly think that can be arrived at; that rules can be formulated whereby you can grade all of the fruit of the state under the same class of rules, because there will be such a difference in the quality of the fruit in different sections of the state. The man who makes a specialty of putting out fancy grades may not want to adopt the rules that apply to the state at large, and it would probably be a hardship for him to do so.

My idea was to assist in that matter by having photographs or illustrations made of the different grades, after it was decided as to what should constitute the different grades, have pictures made and have those copied and enlarged, copied in colors, possibly, showing the highest grade, the next grade showing certain classes of blemishes and the lower grade, if you divide it into three grades.

It seems to me it is very difficult to describe just what blemishes alter the grade of fruit. Now thrip marks on an orange are very different from, say, mocking bird or blackbird marks. A thrip mark the size of half a dollar, is certainly not anywhere near as bad a blemish as bird marks. Then again, some marks of the same size, would make all the difference in the world as to what grade the fruit would go in. Some marks are black and unsightly, while others of the same size are so slight that the fruit could go into the high grade.

My idea was to have pictures of blemishes that would assign an orange to a certain grade that we might decide upon, made, and have these pictures painted in colors—we have at least one member of this Society who could do the work, and do it well—just as you find it done in the illustrations of the Year Book of the Agricultural Department. I would not be willing to suggest just how the oranges should be graded, but whatever grades are decided upon, it seems to me that if you have in your packing house a number of pictures showing the different kinds of blemishes that are allowed in the different grades, in colors and of good size, so that the graders can look up and see at a glance just where a certain blemish belongs, it would help enormously. You can take half a dozen graders and tell them exactly what you want, and they will not do anywhere near alike.

That is one feature of this question. I offer it to you for what you may think it is worth.

Mr. Hume: Mr. Skinner, as chairman of this committee, can you put this in shape for us? It should be in shape so that we could get something in concrete form to get into our proceedings.

Mr. Skinner: I think like Mr. Hart, that it would be very difficult to make a state-wide rule. His idea does not at all conform to Mr. Burton's idea, as I understand it. I confess I am at a loss to know just what is wanted. It is, I think, a vital subject.

Mr. Hume: I think, under the circumstances, that what I have said conflicts with Mr. Burton's idea. I have merely suggested that whatever is decided upon, under his plan, should be illustrated. If you class goldens under any particular brand, illustrate it, and show what a golden is. I shipped some oranges once as goldens, the first I had ever shipped, and they wrote me back that they were not goldens at all. I did not really know what a golden was. Now, if I had had an illustration, faithfully colored, to show me what a golden was, I could have classed them for what they really were. I have not discussed the advisability of adopting a certain grade or grades, but only suggested what I thought would be wise in case such a course was followed.

Mr. Hume: One thought brought out in Mr. Edwards' discussion on the Cultivation and Management of Citrus Groves. I think the way Mr. Edwards went about that work was a very excellent one, and the results obtained from summarizing the best practices in the management of citrus groves under different conditions would be very valuable to us. Of course, we all understand that no set of regulations or rules for the management of one certain grove might be suggested that would obtain under all conditions. I am going to continue Mr. Edwards to take up that work another year. He will send out those circular letters again, and when any of you receive his letter, I bespeak for them your very careful attention.

UNIFORM GRADE KNOWN AS THE FLORIDA HORTICULTURAL SOCIETY GRADE

C. H. Thompson

Mr. President, Ladies and Gentlemen:

I had the pleasure of being a member of the Florida Orange Growers delegation that went to California three years ago, to investigate the workings of the California Citrus Exchange as a selling agency, and to see if that same system could be adapted to Florida.

Upon the return of this delegation the Florida Citrus Exchange was organized, and one of the first Associations organized to affiliate with the Florida Exchange, was the Florida Citrus Growers Association at Florence Villa.

During the summer we built at Florence Villa a packing-house 120x180 feet,

and equipped it with the best up to date machinery we could purchase.

I had the honor of being chosen by our Board of Directors, as manager of the Association for the first year.

We were launching out on an entirely new enterprise, and no one knew exactly what to do along many lines of preparing our fruit for the market. No one thing in connection with our work at Florence Villa gave as much concern to the manager and Board of Directors as the question of grades. The Board of Directors of the Florence Villa Association always meet every Monday morning at the packing-house, and give from one to three hours to the discussion of the various important questions in connection with the business, and for weeks one of the main topics for discussion at these meetings was the question of grading. After many, many trials and changes, we decided to establish three grades to cover all our packing-house output.

We settled on the following order describing these three grades.

"*Florence*" our best grade, is made up of "All smooth, heavy, good shaped fruit, discoloration allowed not larger than a silver quarter."

"*Cat,*" our third grade, is described as, "Not more than three quarters russet fruit, and all merchantable fruit, including odd shapes, small defects, etc."

"*Gondola,*" our middle grade is made up, "All fruit between the Florence and Cat brands."

After three years' shipping under these grades as above described, we have not seen fit to make any change.

We believe it very difficult to establish a uniform grade for the state, as there is such a vast difference in grades of fruit in different sections of the state. We find a vast difference in the grade of fruit that comes from the different groves of our association. The fruit from some groves while going mostly into the higher grades, is so much better than the best from some other groves that it is difficult to keep up an "even grade," and we find it very essential to keep up at all times an "even grade," so that the buying public may become acquainted with our grade through the names we give them.

Report of Inspector of Nursery Stock

E. W. Berger
INSPECTOR OF NURSERY STOCK

Mr. President, Ladies and Gentlemen:

The Law governing the inspection of nursery stock in Florida was passed by the State Legislature a year ago, and approved by the Governor on May 23, 1911. The need of an inspection law, or a horticultural law, had been apparent for some time, and it is an unfortunate circumstance for the fruit growers of Florida, that such a law was not passed 40 years ago. If such a law had been passed then, the several species of the whitefly of citrus and scale insects would probably not be in Florida to-day.

But a nursery inspection law became a necessity last year when the Office of Experiment Stations at Washington, which exercises a certain degree of control over the funds appropriated to the Experiment Stations by the Federal Government, ruled that such funds could not be used for inspection purposes. This ruling left the nurserymen of the State without an inspector to inspect and certify their shipments of stock intended for other States that require inspection and certification.

It may be added here, that a large part of the nursery stock grown in Florida is sold and shipped into other States and some to foreign countries, and that this trade is a very desirable one for Florida.

Prior to July, 1911, the Entomologist of the Experiment Station had been permitted to make the inspections for the nurserymen, and they and the State as a whole got along as best they could. It goes, of course, without stating, that it would have been ill advised, even had it been possible, not to have had the law made applicable to all nursery stock in this State, whether sold in the State or outside, and I believe that all who have given the matter careful study will agree that a law regulating the transportation and exchange of nursery stock was much needed, and that such a law should have been passed long ago. The law passed a year ago was probably the best law obtainable under the circumstances and at that time. But it made a beginning. Additional legislation governing the control of insect pests and diseases of the grove, orchard and field crops, should result in great benefit to the State, and all growers of horticultural and agricultural products should welcome such assistance as a well-planned law would give them.

RULES AND REGULATIONS

The State Nursery Inspection Law provides that all details of its administration shall be in the hands of the State Board of Control. This is considered to be a wise

provision, since it makes the law very elastic; that is, changes and additions to the Rules and Regulations (these have the effect of law) can be made quickly without an appeal to the Legislature. To appeal to the Legislature for minor changes or additons of matter that can readily be handled by a Board would frequently result in much loss of time, and the changes required come too late to be of use, or to meet the exigencies of the time. The State Board of Control meets once per month, so that modifications and additions to the Rules and Regulations can be obtained in a brief period of time, and as the need for them arises.

While at a meeting of the Association of the Cotton States Entomologists, at Atlanta, during last December, this question came up during a discussion of the Mexican Cotton Boll Weevil situation, and it was unanimously recommended that all laws should be so drawn as to permit the greatest latitude of power in a Board, whose duty it should be to make all Rules and Regulations governing the administration of the law, and whose acts should have the effect of law. Several officials of the Southern Ry. Co. were present, and it was their opinion that, by vesting the making of Rules and Regulations in a Board, greater uniformity between different States would be the result, than when too many of the details are fixed in the statutes. These railroad men also directed attention to the difficulty they have in keeping their employes posted on the different State laws pertaining to the shipments of quarantined and prohibited articles, and that greater uniformity between the States would greatly simplify matters for them, as well as make the laws more effective.

The first set of Rules and Regulations were formulated during June and July, 1911, adopted by the Board of Control on August 1, and published in Nursery Inspection Circular 1, September of the same year. Twenty thousand copies of this circular were printed, and all but about two thousand copies have been mailed to the transportation companies and their agents, the State press, the nurserymen and others. Nursery Inspection Circular 2 was an announcement, issued last August and mailed only to the press.

Additional Rules and Regulations on the Mexican Cotton Boll Weevil, Irish Potatoes, Mango Weevil, Fruit Flies, and Exceptions to Rule 1 (Nursery Inspection Circular 1), were submitted to the Board of Control and adopted by them on April 8, 1912. These Additional Rules and Regulations are now in the hands of the printer and will be published as Nursery Inspection Circular 3.

INSPECTOR

Under the State Nursery Inspection Law, the Inspector of Nursery Stock is appointed by the Governor, and the present incumbent entered upon the duties of this office on July 1, 1911. It has been the steadfast purpose of the Inspector to instruct and guide, especially the smaller nurserymen, to plant and grow their stock in localities free from insects, or to adopt methods that will keep their stock free from insects and diseases. It is much

easier to keep a block of nursery stock free from insects and diseases than it is to clean it up after it is once infested or infected.

To request a man to do this or that, point out his difficulties or shortcomings, with a gentle admonition to set things right, is much pleasanter than to appear like one wielding a big stick. Of course, should a man refuse to take the hint and not comply with the requirements, but become defiant, then he simply places himself amenable to the law. The Inspector believes, however, that with but one or two exceptions, he has succeeded in getting and retaining the good will of the nurserymen and others interested.

DIFFICULTIES

No doubt there has been, during the past year, a certain amount of exchange and transportation of nursery stock that was illegal. Transportation agents will forget, and shippers, unless they are regular nurserymen, do not always know that there is a law, although the law was published in each county, and about 18,000 copies of Circular 1 were mailed throughout the State.

However, several illegal shipments of stock came to the Inspector's attention. One was a shipment of 500 citrus trees from Pinellas county to Terra Ceia island. The trees had been planted before the Inspector became cognizant of the shipment. An inspection of the trees by Inspector resulted in his making the following requirements: To defoliate all the trees and to burn the leaves; to spray them with Bordeaux mixture; and after two days with Yother's Formula Four*.

*Yother's Formula Four is made by emulsifying 3 gallons of Junior Red Engine Oil, (25° Baume) in 2 gallons soft whaleoil soap mixed with one gallon water. The mixture is compounded cold. Slowly add the oil to the mixture of soap and water and keep stirring. For spraying use 1 gallon of this mixture in 50, 60 or 70 gallons of water. The Junior Red Engine Oil is a Standard Oil Co.'s product.

After the manager had made affidavit that this treatment had been carried out the matter was considered settled.

Another lot of about 200 trees was shipped by another party in Pinellas county into Pasco county. This shipment was handled like the preceding one.

Two thousand small citrus seedlings, thoroughly infested with scale insects, were moved about 15 miles by a certain individual in Dade county, and planted among another lot of clean seedlings. The matter was taken in hand by the Inspector, and after some parleying the seedlings were ordered to be pulled up and burned. This order was duly executed after only about one day of delay. In this instance a very nice lot of clean seedlings were saved from infestation by the scales that literally plastered the seedlings that were destroyed. (Rule 11, Nursery Inspection Circular 1, was made the basis of the Inspector's order).

The express agent at Homestead, Mr. A. M. Budd, was the first to wire the Inspector that a shipment of citrus trees, having no certificate attached, had reached his office, and that he awaited the Inspector's orders. It was found, however, that these trees came from a certified nursery, and that the certificate had some how

or other been omitted from the shipment. When the facts became known the trees were delivered to the consignee.

Not very long after that, Mr. Budd again wired that a small consignment of peach and plum trees, without a certificate attached, had been received. Being about to make a trip of inspection to Homestead the Inspector wired Mr. Budd to hold the trees. The trees proved to be five small peach and plum trees sent by a private party in Hillsboro county. Two of the trees were found to be infested with San Jose scale and were burned in the firebox of a locomotive, the consignee readily consenting. The others, not found infested, were released subject to a scrubbing with soap. Thus the Homestead section may have been saved, for the time being, at least, from becoming infested with the San Jose scale.

The latest uncertified shipment brought to the attention of the Inspector consisted of seven bundles of citrus trees sent by express from Lakeland to Winter Haven. These trees were not defoliated and had whitefly upon them. Fortunately, someone interested in keeping the Winter Haven section free from whitefly as long as possible, discovered the trees at Winter Haven, before they were delivered to the consignee, and reported the matter to the Secretary of the Citrus Protective League at that place. It happened also that the Route Agent of the Express Company was on the ground. The outcome of the matter, as reported to the Inspector, was that the trees were expeditiously burned, then and there. This all happened before the Inspector was notified.

Flagrant violations of the law, and an indifferent or defiant attitude on the part of shippers and transportation agents, would sooner or later necessitate the starting of prosecutions either by the initiative of the Inspector or others interested.

PESTS THAT THREATEN FLORIDA

Perhaps the greatest benefit to the fruit industry of the State, that will come from this law, will be the keeping out insect pests and diseases of trees and plants not at present in Florida. A complete list of such insect pests and diseases would soon become tiresome and is not needed here. The fruit flies are to be feared most. Of these there are two principal species: The Mediterranean Fruit Fly and the Morelos Fruit Fly (Mexico Orange Maggot). Just why these insects have never gained a foothold in Florida is an open question. The Mediterranean Fruit Fly has reached Hawaii, and is at the present time causing California the gravest concern, and that State is more than doubling its vigilance in order to keep it out. The First Vice-President of this Society once remarked (I may not have the exact words) "We will forget the whitefly when the fruit fly invades Florida." The following fruits are reported to be attacked in the Hawaiian Islands (List by E. K. Carnes, *The Monthly Bulletin*, Vol. 1, Dec. 1911, State Commission of Horticulture, of Calif.):

"All Species of Citrus Fruit.
Peaches.
Figs.
Grapes.
Rose Apple.
Star Apple.
Mangoes.

White Lemon Guavas.
Wild Guavas.
Alligator Pears (bruised or fallen).
Strawberry Guavas (fruit).
Papaya.
Sapota.
Carissa arduina (South African fruit).
Also String Beans and Peppers.
The Pineapple and Banana seem to be immune, so far, from attack."

Mr. Carnes further states that he has taken over a hundred live jumping maggots from a single wild guava not larger than an apricot.

A large number of scale insects in the West Indies and in the Mediterranean countries are on the waiting list to be brought into Florida. Chief among such infesting citrus is *Parlatoria zizyphus* and *Aspidiotus articulatus* (The Rufous Scale). The latter has, however, already been reported from Key West and Anona, Fla.

Neither have we all the whiteflies (Aleurodidae) in Florida. The following list is taken from the *West Indian Bulletin*, Vol. IX., No. 4, 1909, "The Aleyrodidae of Barbadoes," by C. C. Gowdey. This list is probably quite representative for the West Indies and America in general, and shows us that there are a number of whiteflies, not at present known to be in Florida, right at our very door. (When, in this list, the insect also occurs in Florida, it is so indicated):

I. Genus Aleyrodicus, Douglas

1. *Aleyrodicus anonae*, Morgan.
Habitat.—Barbadoes, British Guiana, Brazil, Trinidad.
Food Plants.—*Anona muricata, A. reticulata, A. squamosa, Ficus, Pritchardia pacifica.* [Anona is Custard Apple.]

2. *Aleyrodicus cocois*, Curtis.
Habitat.—Barbadoes, Trinidad, British Guiana, Venezuela, Brazil.
Food Plants.—Cocoanut, palms, *Psidium Guajava* [Guava].

3. *Aleyrodicus dugesii*, Cockerell.
Habitat.—Barbadoes, Mexico.
Food Plants.—*Begonia, Hibiscus rasa-sinensis.*

II. Genus Aleyrodes, Latreille

1. *Aleyrodes citri*, Riley and Howard.
Habitat.—Barbadoes, China, [India], California, Florida, Louisiana, Maryland, Mississippi, Georgia, District of Columbia, [Gulf Coast of United States].
Food Plants.—*Citrus* spp., *Melia azedarach, Viburnum nudum, Gardenia florida, Diospyros kaki, Prunus Caroliniana, Quercus aquatica.* [For list for Florida consult Bul. 103, Florida Experiment Station.]
[1a. *Aleyrodes nubifera*, Berger.
Habitat.—Florida, Cuba, Gulf Coast of U. S.
Food Plant.—Citrus, all species.]

2. *Aleyrodes floccosa*, Maskell.
Habitat.—Barbadoes, Jamaica, Mexico.
Food Plant.—Lignum-vitae.

3. *Aleyrodes floridensis*, Quaintance.
Habitat.—Barbadoes, Florida.
Pear, Smilax, *Theobroma cacao.*
Food Plants.—*Psidium Guajava*, Avocado

4. *Aleyrodes goyabae*, Goldi.
Habitat.—Rio de Janeiro, Barbadoes, Europe.
Food Plants.—*Laurus persia, Persea gratissima, Psidium Guajava.*

5. *Aleyrodes harridus*, Hempel.
Habitat.—Barbadoes, Brazil.
Food Plants.—*Psidium Guajava, Ipomoea battatus*, [Citrus (Brazil)]

6. *Aleyrodes Howardii*, Quaintance. [The Woolly Whitefly.]
Habitat.—Cuba, Barbadoes, Florida.
Food Plant.—*Citrus aurantium.*

7. *Aleyrodes vaporariorum*, Westwood. [Greenhouse Whitefly.]
Habitat.—New Jersey, Illinois, Massachusetts, Connecticut, Pennsylvania, Indiana, Mexico, Brazil, Barbadoes, Europe.
Food Plants.—[Many herbaceous plants.]

8. *Aleyrodes variabalis*, Quaintance.
Habitat.—Barbadoes, Florida.
Food Plant.—*Carica papaya* [papaya].

Of this list of 11 Aleurodidae, five only are positively found in Florida.

The Mango Weevil, like the Mediterranean Fruit Fly, is not known to occur

in America, but due precautions should be exercised in making importations of mangoes and mango seeds. The Mango Fruit Fly in Porto Rico, and other mango insects, such as scales, in the West Indies, need watching.

The writer is informed by Mr. John Belling, who resided in Barbadoes for about six years, that large parts of the West Indies are veritable hotbeds of insects that attack plants. Botanic gardens are in most instances the sources from which the infestations spread. In these botanic gardens plants from all over the world have been brought together, and, until recently, with but little, if any, thought of the insects and diseases that accompanied them.

The Bud Rot of cocoanut trees is present in Cuba, adjacent islands and some coast regions. The writer is not aware that it exists in Florida, but should it become introduced, its ravages would probably destroy the larger part of all the cocoanut trees in Florida. The rot is caused by a bacillus, probably the *Bacillus coli,* the bacterium which is almost universally present in the large intestine of human beings and some other animals. Birds, especially the turkey buzzard, and insects, are supposed to be the principal carriers of this disease. The germs of this disease have been found in the droppings of the buzzard.

The Wart Disease of Irish potatoes (*Chrysophylyctis endobiotica,*) found to be seriously injuring potato crops in England, Wales, Scotland, Ireland, Germany, Hungary and Newfoundland, should by all means be kept out of Florida. Nursery Inspection Circular 3 gives the Rules and Regulations provided for keeping out this disease.

All in all, the Inspector believes that the State Nursery Inspection Law is quite satisfactory for the purpose that it was intended. As already suggested, additional legislation, however, is desirable, in order to meet the requirements of owners of groves, orchards, etc., for the purpose of protecting themselves against insect pests and diseases allowed to run rampant by careless and indifferent parties.

Again, a law becomes most useful only when those for whose protection it was created, take an interest in its enforcement. A nursery inspection law is for the purpose of protecting the buyer against the sale of diseased and insect-infested nursery stock, as well as for protecting the State as a whole against the introduction and dissemination of insects and diseases. The degree of protection would become practically complete, if every buyer would buy only certified stock and not be content to buy from growers of nursery stock who are evading the law. When importing stock from abroad, arrangements should always be made to have the stock inspected upon its arrival in the State, in order to be positive that there is no injurious insect or disease present.

NUMBER OF NURSERIES INSPECTED—ACREAGE

Finally, sixty-nine nurseries were inspected during the year, July, 1911 through June, 1912. The acreage of sal

able nursery stock inspected, as reported by the nurserymen, was 753 acres. The acreage to be inspected during 1912-1913 will probably approximate 1,000 acres.

In the execution of his official duties, the Inspector traveled approximately 10,500 miles, by rail.

Citrus Diseases

A. P. Spencer

The Florida Experiment Station contributed to the twenty-fifth annual program of the Florida State Horticultural Society a collection of characteristic specimens of the most important diseases that attack citrus fruits in Florida.

The exhibit was made in three sections, as follows:

SECTION I.—Those diseases produced by fungi, and studied in the laboratory of the plant pathologist: Stem End Rot, Withertip, Gummosis, Scab.

SECTION II.—Those diseases originating from soil conditions or mal-nutrition, and studied in the laboratory of the plant physiologist: Dieback, Melanose, Yellow Spotting.

SECTION III.—Those troubles due to insect pests, and studied in the laboratory of the entomologist: Whitefly, Scale, and other insects, and also the fungi recommended for their control.

The exhibits were typical of the different stages of the diseases they represented and were the best, at the time they were gathered, specimens that could be collected from the various sections of Florida by those giving these diseases special study at the University of Florida.

Photographs of different stages of diseased material supplemented the specimens, so that nearly all the features and stages of the diseases were shown. Each specimen or photograph was carefully arranged and clearly labelled, making the exhibit plain and instructive.

As this was the first collective exhibit taking in all the more important diseases of the citrus fruits of Florida, it attracted much attention from the members of the Horticultural Society. It gave them a welcome opportunity to compare different diseases whose symptoms are similar, since the control of citrus diseases is one of the main problems with most of the growers.

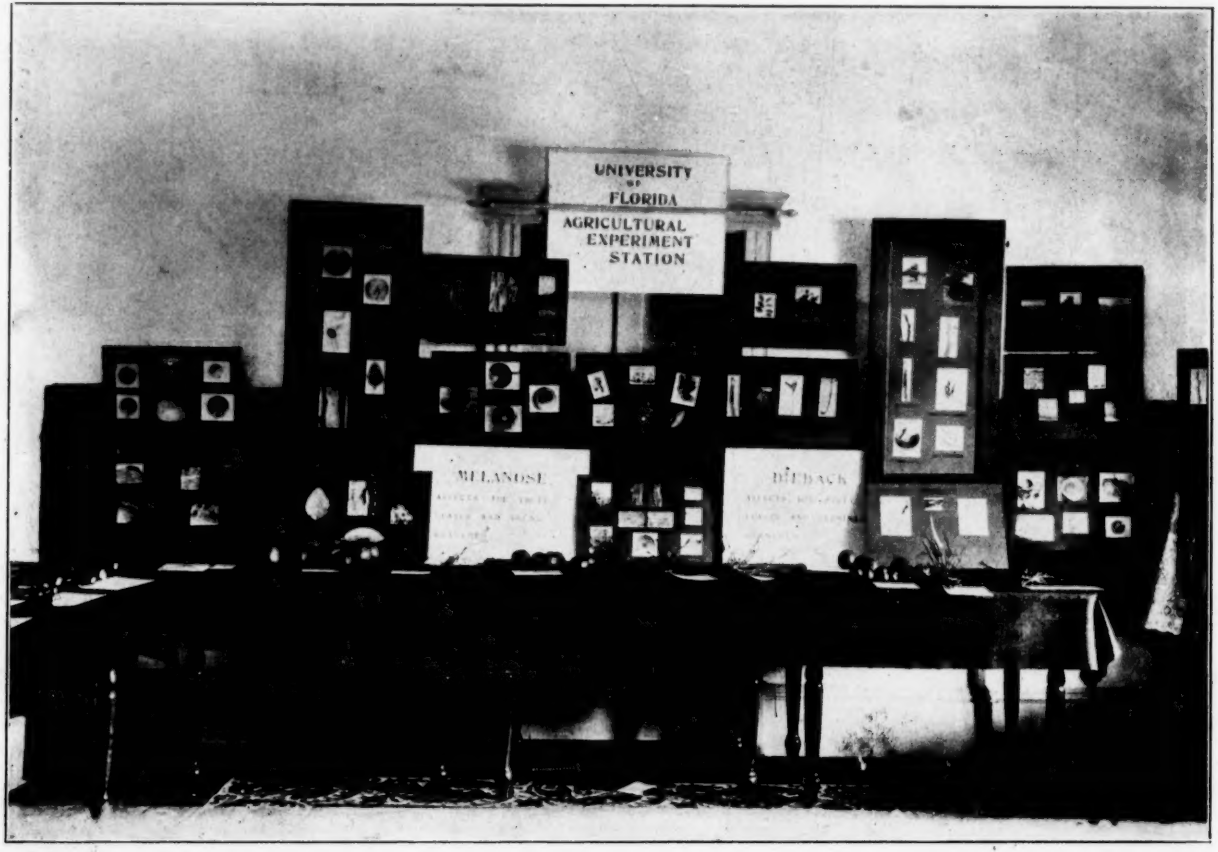
The illustrations of disease were accompanied by a circular outlining the main characteristics of the trouble, and suggestions for its prevention or control. Also Bulletins 103, 106, 107 and 108 were distributed.

The officers of the Experiment Station were questioned on different phases and combinations of these diseases, and much direct information was gained thereby, of which many took advantage.

The ladies' reception parlor of Halycon Hall was given over to this exhibit and was well adapted for the purpose.

The placing of the exhibit, the care and explanation of same during the meeting was in the charge of Mr. A. P. Spencer, of the Experiment Station at Gainesville.

SECTION I.—PLANT PATHOLOGY EXHIBIT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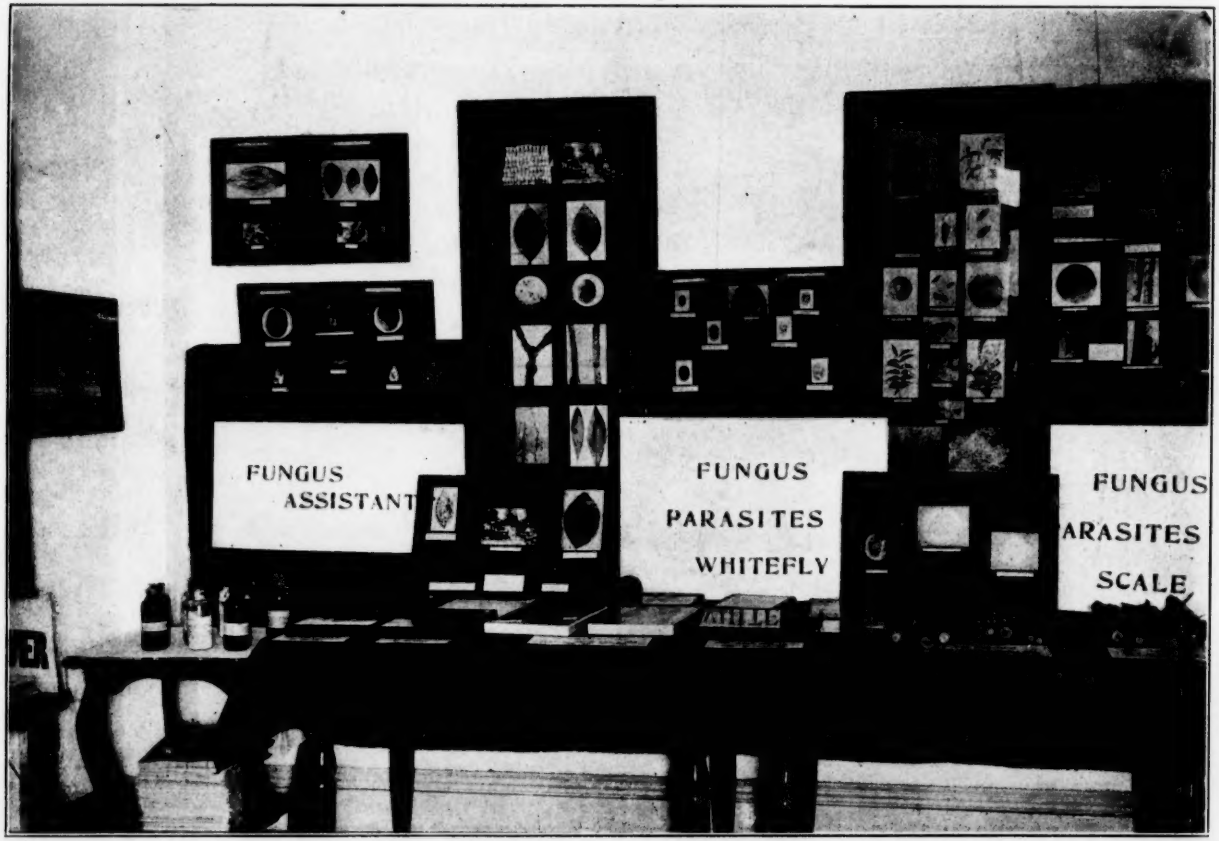

SECTION III.—ENTOMOLOGY EXHIBIT.

Insects and Diseases of the Year

E. W. Berger

CHAIRMAN COMMITTEE ON INSECTS AND DISEASES

Mr. President, Ladies and Gentlemen:

The following list of insects and diseases of plants for the year, with remarks, were furnished in large part by members of the Experiment Station Staff:

I. Diseases

CITRUS DISEASES

Citrus Scab, or Sour Scab. This disease has been severe and is at present infecting the young fruit and young leaves, especially of pomelo; but in several localities, oranges are not altogether immune. It is generally worse in the southern parts of the state.

Withertip and Anthracnose. As "withertip" on the trees, this disease has not been severe. As "Anthracnose" on the fruit, considerable loss was experienced during January and March.

Stem-end Rot of Citrus Fruit. This disease has not been severe except in a few places.

IRISH POTATOES

Late Blight (*Phytophtora infestans*). This disease has been severe at Hastings and at Federal Point, resulting in a loss of one-third to one-half of the crop.

Early Blight (*Alternaria solanii.*) This was more or less severe at Bartow and Brooksville.

Fusarium Blight (*Fusarium oxysporium*). This disease was reported from different places. It causes wilting of leaves and stems. Infection takes place at the ground, and it also infests the tubers. There is no remedy.

Bacterial Wilt (*Bacillus solanacearum*). This sometimes causes great loss, but it was not severe last year. There is no remedy.

TOMATOES

Fruit Rot. Reported as doing considerable damage at Palma Sola and some other places.

Blossom-end Rot. Reported to be very severe. Cause and remedy not known.

Leaf Blight. This was reported from Forest City and Pompano.

CUCUMBERS

Cucumber Rot. This affects leaves and fruit. Brown or yellowish spots, which gradually become holes, appear on the leaves. Early in the morning, before the tissue of the spots drops out, a peculiar ooze forms on the spots, drops of which fall onto the cucumbers beneath and infect them. The disease starts on the fruit as a whitish spot similar to an insect puncture, and it starts to decay in

three or four days. The loss is also heavy during transit. There is no remedy known and the loss has been one per cent. to seventy-five percent.

LETTUCE

Lettuce Rot (*Bacterial*). This disease may start in the seed beds. It infects the leaves and head. It has been of occasional occurrence. There is no remedy.

Lettuce Drop (*Schlerotinia libertiana*). The losses have been one per cent. to 100 per cent.

CELERY

Celery Rust (*Cercospora apii*). This disease produces a brown spotting. The loss at Sanford may be estimated at from one-third to one-half of the crop. Bordeaux mixture, if applied from the time the plants are in the seed bed until harvest time, will keep it down.

Late Blight (*Septoria petrosilini*). This disease produced some injury. Bordeaux mixture will keep it down to some extent.

Black Heart (*Bacterial*). The loss is generally one to three per cent. No reemdy has been found.

BEANS

Anthracnose (*Colletotrichum*). This disease has been very severe this year. Bordeaux mixture and seed selection are the remedies.

Bacterial Blight (*Pseudomonas phaseoli*). Watery spots are formed on the beans. There is no remedy.

CABBAGE

Black Mold (*Alternaria brassicae*). Spots are formed on the leaves. The loss has been large; but Bordeax mixture will keep it down.

OATS

Rust. This disease was reported from Sisco and Youmans as doing much damage and destroying crops.

CORN

A Bacterial Disease. This was reported from Dade City as doing considerable damage.

II. Insects

CITRUS

Woolly Whitefly (*Aleurodes howardii*). This now occurs at Lakeland, St. Petersburg, Limona and Terra Ceia Island, apparently spreading from Tampa, where it was first observed. It is abundant at Tampa and at St. Petersburg. It was found to be very highly parasitized by a minute chalid, or wasp-like insect, which appears to have prevented it from becoming a severe pest.

White-winged Whitefly (*Aleurode citri*) *and Cloudy-winged Whitefly* (*Aleurodes nubifera*). These, the common whiteflies of citrus, are abundant in some localities, while in others they have been kept in check by their fungus enemies. Some localities report that the whitefly has "gone." It will increase again during the next year or two, unless the conditions for the fungus enemies are especially favorable. The fungus enemies of insects tend to operate in cycles; the whiteflies or scales increase for a year or two, then the fungi may increase for a

year or two, and may all but eradicate the insects.

Scale Insects. These have not been reported as especially injurious. The fungus and other enemies of these appear to have kept them adequately in check.

Cottony Cushion Scale. This scale was found by the Station Entomologist at Tampa, and was sent in from Arcadia. This appears to be the first appearance of this pest outside of St. Petersburg Peninsula, and indicates that it is slowly spreading, but has not produced any severe outbreaks.

Pumpkin Bug, Green Soldier Bug (*Nizari hilaris*). This insect was very troublesome during autumn, causing severe damage in groves.

Rust Mite. This mite has been excessively severe.

Six-spotted Mite, Purple Mite. These have not been reported as excessively severe.

Grain Thrips (*Euthrips Citri*). The most serious insect outbreak of the spring of 1912 was produced by this insect. It made its first destructive appearance on the lower East Coast on tomatoes and became very severe throughout the citrus section of the State, where it was reported as having seriously damaged the orange crop. Tobacco decoctions, preferably with small quantities of soap added, are effective against this little pest.

During the previous outbreak in 1901, it also occurred in injurious numbers during the succeeding year on strawberries. It will, therefore, be well for growers, especially of tomatoes, citrus and strawberries, to be on the lookout for the reappearance of the thrips in destructive numbers next spring, and be prepared to spray vigorously.

COTTON

Mexican Cotton Boll Weevil (*Anthonomus grandis*). This pest reached the two western counties of Florida in the fall of 1911. Specimens were received by the Experiment Station from the extreme western county (Escambia county) and it is reported by the Bureau of Entomology, U. S. Department of Agriculture, as occurring throughout Escambia county, and about the western third of Santa Rosa county. Nursery Inspection Circular 3, Office of Inspector of Nursery Stock, Gainesville, Fla., gives the distribution of this insect in Florida in greater detail, with a map illustrating its spread in the cotton growing States since 1892, at which time it occupied only a portion of the two southernmost counties of Texas.

Cotton Leaf Caterpillar (*Alabama argillacea*). The fall of 1911 was characterized by a severe outbreak of this insect. This outbreak occurred all over the Southern States, and flights of the adult moth reached as far north as New York, Massachusetts and even to Canada.

MISCELLANEOUS

Cowpea Caterpillar (*Eudamus proteus*). This caterpillar was very destrutive during the latter part of 1911.

Fall Army Worm. (*Laphygma frugiperda*). This caterpillar was quite troublesome in several parts of the State. It was reported as being very serious in

Gadsden county in April, 1911.

Melon Worm (*Diaphania hyalinata*). *Pickle Worm* (*D. nitidalis*). These were sent in from Dade county, where they were reported to be causing serious injury.

Sugar Cane Borer (*Diatraea saccharalis*). This was reported as a serious pest in several parts of the State. It was stated by one grower that they were unable to grow cane in his part of the State on account of the ravages of this caterpillar. Those planting cane in some of the lower parts of the State, like the Everglades, should be particular and get "seed" free from this pest, which is the most serious insect enemy of sugar cane in this country.

Corn Bill Bug (*Sphenophorus Sp.*). This was reported as doing much injury at Greenville, from which place specimens were received.

III. Spraying Solutions

In conclusion of this report on the principal insects and diseases of the year, the writer wishes to direct attention to the apparent need of a spraying solution that will be effective against insects (principally scales and whitefly), mites, (rust mite, purple mite, six-spotted mite), and fungus diseases of citrus trees.

The growers of peaches, plums, etc., fruit trees subject to infestation by San Jose Scale, appear to have a reliable remedy in the lime-sulphur solution. This destroys the scales, and also many of the fungus diseases that injure such fruits. When only San Jose Scale is present, the fungus diseases being absent, the fungus parasites that destroy scales may be introduced, if not already present, and these will generally subdue the scale insects.

With citrus trees infested with whitefly and infected with fungus diseases, the lime-sulphur solution would not be sufficient, because it is of little or no use against the whitefly. Its usefulness against fungus diseases of citrus is also problematical. Its usefulness against the mites of citrus has been repeatedly demonstrated. It is also useful against the scales of citrus. Any spraying solution that would kill whitefly would probably kill scales, so that our problem resolves itself into finding a mixture that will kill whitefly, fungus diseases and mites of citrus.

In order to explain more fully, it should be stated that the fungus diseases of scales and whitefly generally give a wholesome degree of relief from the attacks of these insects, generally quite satisfactory to the majority of growers. There are those, however, who wish to grow fruit that is freer from melanose, withertip markings, and disfigurements due to other causes. One prominent grower has stated it this way: "Is it necessary that a tree should have anything upon it but leaves and fruit? (No). Ten per cent. of my fruit is in demand, while for 90 per cent. it is necessary to find a market. If I could reverse the percentages it would pay me handsomely."

Bordeaux mixture may be used to keep down the fungus diseases, but scales and whitefly would increase. The grower could then spray with an oil emulsion to

check the scales and whitefly; and whether spraying with Bordeaux mixture or with oil emulsion, sulphur could be added in some form or other to check the mites. But what is wanted, is a spraying solution that will kill the insects and mites and destroy the fungus diseases such as withertip, melanose and others.

Some suggestions are possible. One prominent grower has, apparently, obtained good results by mixing Bordeaux mixture with whaleoil soap solution. But as Bordeaux mixture decomposes large quantities of the soap the mixture appears to be an unnatural one. That it is useful appears to have been demonstrated. But carefully planned experiments, with checks, are desirable.

Soap and carbolinium may prove effective and should receive further trial.

There is also on the market a soluble copperized oil which may be full of promise. The oil would kill the insects and mites; the addition of flowers of sulphur probably make it more effective against mites, and the copper present probably keeps down the fungus diseases.

INSECTS AND DISEASES

George L. Faucett

Prof. Rolfs has suggested that, as a member of the Horticultural Society, I present for the Miami meeting a few notes on the diseases and cultivation of citrus fruits in Porto Rico. It is possible that this subject is of some interest to the Florida citrus fruit growers, as Porto Rico is already a competitor in the markets and will be increasingly strong as this industry develops. Up to this time its growth has been rapid. Before the American occupation little or no fruit was exported from the island. In 1901 forty thousand boxes of oranges were shipped and ten years later seven hundred thousand. In addition to this about half as many boxes of grapefruit were shipped. Should the growing of this fruit continue to be reasonably profitable the area devoted to its cultivation will be greatly increased. At present only a comparatively small acreage is given over to these fruits.

Of the oranges, wild and cultivated, the former makes up the greater part of the fruit exported. In quality the wild fruit is very good being superior to much of the cultivated fruit, although it is lacking somewhat in uniformity. Among these trees are some with fruit suitable for budding and in some instances they have been used for this purpose. These wild trees receive no fertilizer nor cultivation of any sort. They are usually found along the paths in the coffee plantations where they get the benefit of the shade and wind protection always provided for the coffee. The fruit is not

gathered except on those plantations which are not too far distant from the shipping points and which have good roads, in which case it is put in crates and carried in ox carts or on pack animals to the commission house which usually pays from forty to seventy-five cents a box. Often the crop is sold on the tree in order to avoid trouble of picking and transporting the fruit. Owing to the fact that it is a by-product of the coffee plantations and that a large number of trees may be grown without interfering with the coffee it is profitable for the planter. The more progressive coffee planters are beginning to become interested in growing budded fruit either of some native or American variety, as the superior varieties of either orange or grapefruit may be grown under such conditions as cheaply as the commoner sorts. Those who are fortunate enough to have budded over the native trees to grapefruit are now receiving the benefit. The native grapefruit, of which a few are found on these plantations, is too acid to be of value and is used locally for a sort of "dulce" or preserve. The yield of both orange and grapefruit under the conditions is fairly large. Although uncultivated, these trees are remarkably free from diseases. The moisture and protection from wind favor the fungus enemies of the scale so much that these insects offer little trouble. The fruit never needs to be washed. The withertip fungus sometimes kills back young succulent shoots, but on the whole does the wild trees but little harm. I have noticed no other injurious fungus among them.

In the case of the cultivated fruit, of which there are quite a number of groves, mostly owned by the Americans, on the north side of the island, we do not have conditions differing so markedly from those familiar to the Florida grower. For the most part the varieties of fruit and methods of cultivation are the same as in Florida. The labor, which is fairly efficient, is paid somewhat less than in Florida. The trees do very well on the better lands with little fertilizer, but on the sandy soils near the coast it is necessary to make heavy applications. As to diseases in these trees, gummosis is quite common on excessively moist lands. The most effective remedy seems to be the drainage. The withertip is more common among the cultivated trees than among the wild, but this is probably due in part to the poorer protection from winds usually found in the groves. The trees exposed to the wind are often attacked by both scale and withertip. I have found no fungi injurious to these trees except those common to Florida. Almost always a bad condition of the trees, wherever it occurs, is due to lack of protection from wind. The groves are now protected, though often insufficiently, by windbreaks of mango or bamboo. Where there is enough wind protection the scale is kept down by the fungi as eeffctively as is the case of the wild trees.

The rather favorable condition here with regard to the fungus diseases of the trees is to be partly explained by the fact that the industry is young, trees few years. As time passes other pests

may come in and those already active become more injurious. The wild trees are probably favored by the natural selection of the hardiest such as that to which other wild trees are subjected, and to the fact that they are scattered. If the industry ever becomes so profitable as to cause their being planted in groves on the hills now occupied by coffee, the diseases will gain a better foothold. The whitefly, if introduced, would probably be kept down by the scale destroying fungi for which Porto Rico offers such favorable conditions. But other insect pests such as beetles and ants are troublesome.

Although the Porto Rican fruit grower has to depend largely on his own experience in the cultivation of this fruit he has been helped by the experience and methods of Florida, through the literature of the subject, and in other ways. Some of the pioneers in the industry came here from Florida, and Floridians have been employed occasionally to take charge of groves or packing houses. From these the planters as well as the laborers have learned much. There seems to be no way however, by which the industry in Florida can be benefited by Porto Rico unless it would be through the introduction of some of the superior native varieties of orange. But these would probably be found to be over sensitive to cold and less excellent when removed from Porto Rican conditions. Hoping this paper will be of some interest, I am,

The Fate of Nitrogen in the Soil

A. W. Blair

Nitrogen, unlike the other elements used in the preparation of commercial fertilizers, did not originally exist in the earth's crust. It belonged exclusively to the atmosphere. At some later period, probably with the formation of soil, it began to be brought into combination and thus stored up in the earth. Without doubt bacteria were the most potent agency in this work—those that live in association with leguminous plants (symbiotic), and to a lesser extent the non-symbiotic bacteria. Atmospheric electricity also, in a limited way, has played a part in causing nitrogen to combine with oxygen. Finally enough had thus been accumulated on the surface of the earth to enable plants to get a foothold. Then began the endless nitrogen cycle. From earth to plants and from plants back to earth again, either directly or indirectly through animal life, there again to begin the ceaseless round.

Through bacterial activity, new supplies are constantly being extracted from the air and just as constantly some of that which has been combined is being lost, so far as plant life is concerned, into the deeper portions of the earth, whence much of it eventually finds its way into the sea. Some, through dentrification, passes directly from the soil or from decaying organic matter back to the atmosphere whence it came.

These processes have gone on through the long ages, until finally enough has been stored up in the earth, in the combined form, to produce the wealth of vegetation—grains, fruits, grasses, forests—which makes it possible for man to inhabit the earth. Man has discovered large deposits of this combined nitrogen, with which he supplements the supply that has been fixed in the soil. He has further learned how to utilize that which was stored up in the boundless coal beds of the earth, and we now tap the inexhaustible atmospheric reservoir with our powerful electric currents, and thus supplement the work of our invisible agents in the soil.

Thus we find nitrogen in combination in the three great kingdoms—the vegetable, the animal, and the mineral; and in these forms it is widely used as a means of increasing crop yields.

That it is the most expensive of all the fertilizing materials is well understood by those who have given the subject any thought, and for this reason it is of the utmost importance that we should have the fullest possible information concerning its effect upon the crop, and its fate when placed in the soil.

Perhaps no body of men who cultivate the soil have given this subject as thorough study as have the citrus growers of Florida, and still what we know is small in comparison with the unknown.

In studying such a question a number of factors or influences must be considered. These factors are not constant, because crops, seasons, soils, raw materials and internal and external soil forces cannot be constant.

As the first one of these variable factors, we may mention the forms of nitrogen which are used, or exist in the soil.

a. Soluble forms such as the nitrates, and sulphate of ammonia.

b. Practically insoluble, but readily nitrifiable organic compounds, as dried blood, tankage, cottonseed meal, stable manure and green manure crops.

c. Inert materials, as coarse manure, peat, untreated leather, twigs, grasses, leaves, etc.

Second, we must consider also the forces acting on the nitrogen in the soil, as the crop, bacteria, rain and gravitation and capillarity.

The character of the soil constitutes a third factor which is not constant, for it may be sand or clay or one of many intermediate stages; it may be alkaline, neutral or acid in reaction.

A fourth variable factor to be reckoned with is the season, for our nitrogen in the soil or in fertilizers that are added to the soil, will not meet the same fate in a wet season that it will in a dry one, and the results in a cold late spring will not be the same as the results in an early warm spring.

The kind of crop to be grown and the influence of other fertilizing materials are also factors which cannot be overlooked as we consider what becomes of the nitrogen in the soil.

FORMS OF NITROGEN

A general separation into (a) soluble, (b) readily nitrifiable, and (c) inert materials has already been made.

Of the soluble materials, nitrate of soda and sulphate of ammonia are at present the most used.

The nitrates are readily soluble in the soil moisture, and require no further change before being used by the plant. For these reasons they are better adapted for use during periods of drouth or moderate rainfall. During periods of heavy rainfall they are leached out rapidly and the more open and sandy the soil, the greater the loss. Analyses of drainage water from experiments conducted at the Rothamsted Station, England, the Cornell Station, N. Y., and the Florida Station, all show heavy losses of nitrates. The analyses from the soil tanks at the Florida Station show heavy losses of nitrates even when no commercial fertilizers have been applied, indicating a rapid nitrification of soil organic matter under the extremely favorable conditions which exist there during the rainy season. Such losses cannot be entirely prevented.

They may, however, be appreciably lessened in a grove by having the soil well filled with humus to act as a sponge, and by allowing grass and beggarweed to grow during the rainy season. A part of the nitrogen of the nitrates will be built

into these to be again returned to the soil when the plants die down in the fall. This procedure need not be looked upon as robbing the trees, for, as has already been intimated, the conditions for the nitrification of soil organic matter are especially favorable at this season, and a part at least of the nitrogen that is saved in the cover crop would otherwise have been lost. As soon as the rains have ceased the growth of this cover crop should be stopped either by mowing or plowing, for if left it will pump out of the soil much moisture which should be saved for the trees.

At times when the nitrates are subject to loss on account of heavy rains, the organic materials like blood and tankage, both of which could be used on vegetable crops and in general farming (if not in groves) would nitrify rapidly enough to furnish the plant with food, but without the danger of so much loss as would occur with nitrates.

Sulphate of ammonia stands between the nitrates and the easily nitrifiable organic materials; it is soluble in water, but does not take effect quite so quickly as the nitrates on account of the time required for it to nitrify.

Extensive pot and cylinder experiments conducted at the N. J. Experiment Station (see annual reports for 1910 and 1911 and Bulletin No. 221) have brought out some interesting facts with reference to the percentage of applied nitrogen that is recovered in the crop.

In the cylinder experiments, with a red shale soil, the averages for a ten-year period with four different crops show that 62.05 per cent. of the nitrogen of the nitrate of soda that was applied was recovered in the crops. In the same test it was shown that sulphate of ammonia was recovered to the extent of 43.26 per cent., while the recovery from dried blood was slightly less than that from sulphate of ammonia. In a number of pot experiments where pure sand was used instead of soil (see Rept. Soil Chemist and Bacteriologist, 1911) these materials retained the same order so far as per cent. of nitrogen recovered in the crop was concerned; that is, the highest recovery was from pots that received nitrate of soda, the next highest from those that received sulphate of ammonia, and the lowest from those that received dried blood. However, in the pot experiments the amount recovered from all the materials was usually somewhat higher than the recovery in the cylinder experiments.

In the case of the cylinder experiments it is believed that the recovery was greater than it would have been under field conditions, since the number of plants per given area was greater than it would have been under field conditions, and as a result the available nitrogen was probably utilized to a fuller extent. But suppose the loss is no greater under field conditions, it means that out of every one hundred pounds of nitrate of soda applied, about forty are lost, and that the loss of nitrogen from sulphate of ammonia and dried blood that are applied, is even greater. Some of this nitrogen is lost by leaching, some is converted into gas, and some is transformed into inert

organic matter. In the open sandy soils of the average Florida orange grove the loss could hardly be less; rather would it not be more? We may roughly estimate this loss by calculating the amount of nitrogen removed in a crop, and subtracting this from the amount annually supplied to an old grove. Calculations made from analyses on record at the Florida Experiment Station show that a crop of 300 boxes (supposed to be an average for an acre) would remove 28.3 pounds of nitrogen. Probably most growers would apply annually as much as one ton of a fertilizer that would analyze 5 per cent. nitrogen, that is, 100 pounds of nitrogen. From this we find that we have yet to account for about 72 pounds of nitrogen out of the hundred. A small amount would be required for making new growth, but in an old grove this would be small, and would be largely balanced by the return to the soil of leaves and twigs. It is too apparent that there is a heavy loss even after all allowances have been made.

Is not 50 to 70 per cent. of the applied nitrogen a greater loss than we can afford? It is not possible to apply fertilizers without sustaining some loss, but it is possible to materially reduce such losses. As has already been suggested, this may be accomplished to some extent by increasing the supply of humus in the soil. A saving may also be effected by making frequent small applications of the nitrogenous fertilizers—three or four applications annually. The extra cost of this would in all probability be more than met in the saving thus effected.

The analyses of drainage water, to which reference has been made, have shown that only very small quantities—almost negligible quantities—of phosphoric acid are lost by leaching, and that potash also is lost in rather small quantities, though the loss here is greater than with phosphoric acid; so that these materials need not be applied so often.

Of the inert nitrogenous materials, little need be said, since they are used in the manufacture of commercial fertilizers to only a limited extent. When placed in the soil they are acted upon by the same forces that act upon the more readily available materials, but they become available much more slowly. The nitrogen of twigs, leaves, coarse grasses and weeds, becomes available very slowly; but where the soil and climatic conditions are favorable, a little nitrogen is thus constantly being supplied in available form.

Of the organic nitrogenous materials in general, it may be said that fineness of division has much to do with the percentage of nitrogen recovered in the crop. In some tests with dried blood at the N. J. Experiment Station (Ann. Rept., 1911) the recovery ranged from 20.71 per cent. in a coarse sample to 53.58 per cent. in a sample passing a 100-mesh sieve.

THE FORCES ACTING ON NITROGEN

The three most important forces acting on nitrogenous matter in the soil are water (which in turn is acted on by gravitation and capillary attraction), the crop and bacteria.

Mention has already been made of the

ease with which nitrates are leached out of the soil. If the rain-fall is moderate—just enough to keep the crop growing—or if there is a long period of dry weather, nitrates would without doubt prove the most effective so far as the actual production of a crop is concerned. In some cases they might have a deleterious effect upon the quality of the crop, and this must not be overlooked. If we are dealing with an open sandy soil and heavy rains follow the applications of fertilizers, we may expect to recover in the crop more nitrogen from organic sources than from nitrate, if the two have been applied on the same basis, for the reason that the organic material must undergo nitrification, with the result that the nitrogen becomes available gradually, and with less loss than the nitrate, which goes into solution at once.

While gravitation tends to take the nitrogen beyond the reach of the plant roots, the force of capillarity tends to bring it near the surface again. This is shown by the fact that frequently incrustations of salts, including nitrates, are found on the surface of the soil under certain conditions. The final balance, however, is generally in favor of gravitation; that is, the upward movement is not equal to the downward.

The presence or absence of a crop on the land also has an important bearing on the nitrogen problem. When beggarweed follows the corn crop in the late summer and fall, much nitrogen from the air is stored up in the beggarweed. If such a field be left bare during the winter months, a considerable portion of this nitrogen will be leached out and lost. If, on the other hand, the beggarweed be worked into the soil and the land seeded to rye or rape, a portion of the nitrogen will be again stored up, this time in the rye or rape, to be used as feed or turned under in the spring as a green manure crop for corn or cotton.

The kind of crop also has an important influence. Lyon and Bizzell have shown (Journal of Franklin Institute, January and February, 1911) that the nitrate content of soil under timothy, corn, potatoes, oats, millet and soy beans was different for each crop when on the same soil. In this connection they say: "Under oats and millet there appears to be an increase of nitrates during the very early stages of growth, but this quickly disappears as the growth of the plant proceeds. Under grass there is very little or no accumulation of nitrates at any stage during the growth of the first crop of the year. Under corn, however, the nitrates accumulate in apparently excessive quantity up to the middle of the growing season, and this while the crop is growing actively and absorbing large quantities of nitrogen." They think these phenomena may be accounted for on the assumption that nitrification is stimulated by some processes connected with the active growth and absorbing functions of plants, particularly of corn.

Should such excessive amounts of nitrates accumulate in a grove at certain times, they would certainly have a pronounced effect upon the tree, and their presence might partly account for certain troubles the cause of which is not yet

well understood. This could only be determined after careful study of the nitrate content of the soil at different seasons of the year and over a considerable period of time.

That bacteria and other soil organisms are a force acting on the nitrogenous matter of the soil is now well understood. Certain bacteria are responsible for the nitrification of organic matter, while others cause dentrification. Other organisms are probably nitrogen-consuming and thus for a time render a certain amount of nitrogen unavailable for the use of plants.

It is doubtful if plants could utilize, to any great extent, organic nitrogen were it not for bacteria; their presence in the soil in abundance may therefore mean a good degree of success, whereas their absence might mean partial or complete failure.

THE CHARACTER OF THE SOIL

The character of the soil, too, has much to do with the final disposition of the nitrogen. In an open sandy soil nitrates are lost extensively when heavy rains occur. On the other hand, in a stiff clay soil the losses are not so great, nor does oxidation of the organic matter go on so rapidly. Thus it may be possible for a sandy soil poor in total nitrogen to have in it more available nitrogen than is found in a clay soil that is naturally much richer in total nitrogen. To some extent this condition accounts for the remarkable crops that may be taken from what seems tc be almost pure sand.

A soil may be abundantly supplied with nitrogen in the form of organic matter, but if it is acid, that is, if there is a deficiency of carbonate of lime, this organic matter which, under favorable conditions, would nitrify rapidly and yield a supply of available nitrogen, becomes inert and largely ineffective until the acid condition has been corrected. In the meantime the crop may have suffered for the want of available nitrogen. The nitrogen is in the soil but remains ineffective on account of unfavorable condtions. The same condition may be brought about by the continued use of sulphate of ammonia. The soil is finally rendered so acid that nitrification cannot continue and that which should furnish food for the plant becomes a poison. This has been fully demonstrated by plot experiments at the Rhode Island Station and also by both plot and cylinder experiments at the N. J. Station.

One can readily conceive that the opposite condition, that is, an excess of carbonate of lime, may at times prove detrimental in orange culture. If such a soil is well supplied with organic matter, nitrification would go on with great rapidity during warm weather, provided the moisture conditions were favorable; and if in addition to the organic matter of the soil, nitrate of soda or sulphate of ammonia had been applied it is easy to understand that under such conditions the tree might take up enough nitrogen to set up physiological disturbances. It has been shown for example that by the liberal use of nitrogenous compounds the nitrogen content of the plant may be very materially increased, even to the extent of injuring the product. An example of this is found in the depressed yield of sugar in the

sugar beet where excessive amounts of nitrogen have been used. The same may hold true for the orange. It is a well known fact that it responds quickly to applications of available nitrogen compounds; and if these be applied in excessive amounts, or the conditions in the soil are such as to yield excessive amounts, the nitrogen may be taken up at the expense of quality in the fruit or healthfulness in the tree. The tree cannot protect itself against indigestion. Hence the importance of considering well not only the quality and quantity of fertilizer to be applied but the time of application also. The experiments that are now under way on Lake Harris will throw much light on this question. An analysis of the leaves, wood and fruit from plots that are receiving excessive applications of nitrogen will, when compared with similar analyses from plots that receive the normal treatment, show whether abnormal quantities of nitrogen are being taken up, and these results, when correlated with other results, such as the condition of the tree and the quality and quantity of fruit produced, will furnish the grower information which will be especially helpful in solving this ever perplexing and increasingly expensive nitrogen problem.

THE INFLUENCE OF SEASON

This topic is so closely related to those previouly considered, that it has already received more or less attention and therefore scarcely calls for separate treatment. Two or three illustrations only need be given. Hall has called attention to the fact that a crop like wheat, which is sown with little preparation of the soil, at a time of the year when bacterial activity is low, calls for some active form of nitrogenous fertilizer; while barley which is sown in the spring, when nitrification and other bacterial processes are rendering the nitrogenous materials of the soil available, requires but little added nitrogenous fertilizer, although it takes from the soil about as much nitrogen as does the wheat crop. Hall also mentions the fact that the increased wheat crop after fallow is almost wholly dependent upon the retention in the soil of the nitrates thus formed in the summer.

Pineapple growers on the east coast have frequently observed that during long periods of dry weather, organic nitrogenous materials, especially bone meal and castor pomace, remain on the plants and on the surface of the soil for months without undergoing decomposition. However, when rains come again the effect of the fertilizer is soon noticed.

A study of the nitrate content of pineapple soils (Bulletin No. 104, Fla. Agr. Exp. Station) has shown that during and immediately following periods of heavy rain-fall, the nitrates in the soil are low, but when the rains have fully subsided, the nitrate content begins to rise again, due to the very favorable conditions for nitrification, that is, abundance of partially decayed organic matter, moisture and warmth.

The growing interest in irrigation, both in connection with citrus culture and in vegetable growing, is a standing testimony to the fact that at certain seasons nitrog-

enous materials, and the other fertilizing elements as well, remain in the soil more or less ineffective unless the moisture conditions can be kept up to a certain point.

N. J. EXPERIMENT STATION,
New Brunswick.

METHODS OF HANDLING CITRUS GROVES

William Edwards

Mr. President, Ladies and Gentlemen:

Is grove management, that is to say, the successful production of oranges by the best methods, fully understood or not? If it is, what is it? If not, why not? This is the topic of pre-eminent importance and magnitude to the Florida horticulturist. Its principles are apparently simple in themselves, and it has been exploited more or less intelligently for a term of years, sufficiently long, one would think, to have placed it on a basis unquestionably firm, with the several principles conjoined in its foundation understood and accepted by all. Common talk, however, seems to show that such is far from being the case. Cannot the Society, then, institute methods of inquiry that will shed the light of truth on the situation? Shall it not also as mentor give special counsel and stand behind a more or less fixed course of procedure, placing the stamp of its approval upon a definite schedule of operations that upon given soil under usual conditions would mean success?

If such a result were forthcoming the Society would occupy an important judicial position in the promotion of a work that might easily transcend in use and value anything that it has hitherto accomplished. Whatever its view on this matter preliminary steps in the direction indicated might not improperly be taken at once.

With such thoughts and objects in mind your committee has made a change in reaching out for information in devising and adopting a simple plan for securing actual facts and details of grove management from growers who have so long pursued it in various parts of the orange zone of Florida that they may be styled past masters in their vocation. To these growers, each in his own district, a considerable number of inquiries were submitted, all being identical in form and bearing pointedly upon the general theme by means of a series of concise questions under the following essential heads, viz.: 1. Soil. 2. Culture and Implements. 3. Fostering Humus. 4. Fertilizer. 5. Frost Protection. In another series of questions I think three more points at least had better be covered, viz.: Irrigation, Fighting Pests and Diseases, and relative success in cropping, so that this may be a warrant for the value of the matter contributed by the parties in answer to questions. A few other points might be usefully added in pursuing the method in future. These inquiries were accorded the kindest reception imaginable, 23 of

the recipients responding freely and fully, and treating the several questions so much in detail that each gave what he himself might call "The Secret of My Success." These 23 answers have been read and edited with care, so as to secure uniformity and compactness, while retaining every item of information, and were then brought together in tabular form and according to their topographical position as clearly shown in each case by the answer to the questions relating to the soil. We thus have in comprehensible and available form a body of data referring to groves whose location range from the high pine land of the elevated reigons down across unusual intermediate positions and through hammock tracts of diverse character, ultimately in certain depressional areas running on to flat woods, almost the only kind of ground not represented being rock. Although the data as tabulated are in so convenient a form their nature and value would hardly be evident to hearers upon itemized reading from the platform. It is hoped, however, that they will appear in the proceedings complete and commending them to the members and to the public for full examination. A brief analysis with comments here follows, in order that a definite idea of them may be readily arrived at. On considering the answers to the first question and allowing for local differences of designation one learns that orange groves exist in Florida on almost every description of soil that will hold up a tree. The actual distribution being as follows: On pine land (high), 7, of which one has four feet of soil underlaid with red clay, 2 have some oak and trees of other kinds, on pine land (medium), 2 on pine land (low), 1, on high oak land, 1, (by inference not black jack), on high sandy ridge originally much like scrub, 1, on hickory ridge, 1, (with yellow sand, not common). On snuff-colored loam, in part, and scrub in part (rather anomalous), 1. On hammock (high), 2, of which one includes some pine, and one has some clay subsoil; on hammock proper, 2. On hammock (low), 2, of which one shows some scrub, and one called stiff, (Why), on flatwoods, 3, of which two appear normal in type , one includes some rather low hammock, making a total of 23. The tables, then, exhibit a quite extensive series of soils, the more interesting, perhaps, in connection with their treatment, as directly appearing, though it may indeed show that the orange especially known to be a long-lived tree is also a long-suffering tree of the very best intentions. From the information under the second head assigned to culture, implements, etc., some points assume prominence. In the light of earlier particulars it would appear that the name of the soil in a measure implies the cultural treatment it receives. That from the hoe progressively a comprehensive list of good implements is generally employed, all necessarily adapted to the soil on which they are used, mostly familiar to horticulturists and well entitled to such commendation as they receive, also that a good deal of ability, almost inventive, is brought into play in order that these implements may do their work in certain ways, the reasons for which do not often appear, but which must have in some manner seemed to justify themselves. When it

is observed, however, that the range of fostering care is from nothing to an assiduous, industrious, sweat running system of tillage for practically every moment, one is almost led to exclaim, "What is it all about?" Is it necessary? In short, one is brought face to face with the question of clean culture, as against no culture. A question that a manager even of experience is seldom competent to settle, and one that being concerned with principal factors of expense, should not be allowed to remain unsettled. There is a "best way." Is this whirl of culture in the line? It is a matter that from its position the Society is best fitted to take hold and dispose of. It could at all events, advise a course that might bring it many blessings through the lessening or abolishment of expense. It has been observed that reasons for culture seldom appear in these answers. One is given, however, in No. 9 that should be looked into, and its useful bearing, if any, determined. On a particular grove located on low hammock with some scrub land, and the soil shallow, mowing machine culture of a character in itself unusual is pursued for the reason as given—the "method produces bright fruit." There is, perhaps, room for difference in the meaning of terms, or rather, with regard to the causes that make fruit the opposite of bright. The cultural method, for example, is hardly to be called specialized, but may be primarily only, a reason for producing bright fruit.

Reason for culture may best be found, perhaps, in a wish to stimulate growth or to mulch the soil for the conservation of moisture, but fertilizing in a judicious way, stimulates growth very well, and mulching tillage has been known to be kept up in a time of drought, when leaves were curling and no moisture could be detected in the soil. Many of the members will recall the late Dudley Adams. He was a man of resource, of horticultural bearing, and pre-eminently a grove manager, as his results attested. He seemed to think that when trees got to bearing age they understood their business, and there was no advantage in bothering them, so he fed them liberally, also with more varied nourishment than is usually given. But he did not keep pulling off their bedclothes. Was there anything in what he thought and did? If so it is and was free to all. The matter here discussed is, as has been intimated, a money matter, many grove managers of experience are lined up with the cultivators. Again, is it necessary? It is urged that the Society settle this and give its authority to the outcome for the sake of what may result in a material reduction of expense. The third head in the table gives the answers made with regard to fostering humus. In some cases legumes are grown, but grass, weeds and like spontaneous growth are depended on for the most part, sometimes turned under, sometimes not. There is nothing to show that soil building and a positive and aggressive attainment of greater depth of top soil has been seriously undertaken. It is generally known that in Florida the top soil contains whatever available fertility there is to be found in the soil, while the subsoil is relatively much the poorer, hence, that benefit is to be derived by increasing the depth of the top soil, while

ignorant subsoiling has been known to destroy certain crops. Legumes are for soil building the principal resource and in that connection, whether useful for orange trees or not, culture, of course, is necessary. It is to be hoped that soil building, particularly on the familiar sandy soils of the peninsula, may be more generally undertaken. In connection when legumes are actually grown or mentioned, the answers in a few cases seem singular. No. 23 on the snuff colored loam, "beggar weed and velvet beans failed to grow." No. 6 on flatwood legumes furnish too much organic nitrogen." No. 15, on hammock, legumes were discontinued, "partly on account of trouble in handling and partly because they were believed to harbor insects." It must of course be believed that such objections were of real moment to those sighting them, but the benefits to be derived from systematic soil building and humus making are nevertheless worth striving for, being really of the greatest importance, for the immense area of peninsular soils. Perhaps some of the ingenuity expended on certain sorts of tillage in groves would be found effective in meeting these objections. *That* "giving too much organic nitrogen," for instance, which cites as a fact what only could be determined by prolonged expert inquiry, which it is fair to presume has not been made, produces a feeling of doubt in the mind of one studying the table, since the function of legumes is particularly to supply nitrogen, and here would seem to be a great point gained. But again, if there were indeed too much organic nitrogen would it not be simple to meet the conditions by a suitable mixture of ingredients at the next application of fertilizers? Some reference having been made to the sandy soils of Florida it seems advisable in view of fostering humus therein to say a few words regarding them. A majority of the peninsular soils show over 90% of silica, running even as high as 97%, while from them the materials chiefly entering into plant life, various universal salts, ammonia, etc., are conspicuous by their absence, being reduced to traces ridiculously small. A considerable part of the few remaining components consists of carbonaceous matter. Where is the fertility of such soils? Since it is not a matter evidenced by chemical analysis, it must be extrinsic, brought from outside, otherwise there would scarce be one pine tree to an acre. It is a fair supposition that the clay-sand substratum so generally underlying the peninsula turns the moisture laden with an increment of plant food, to which it is impervious in various directions, where it is reached by tree roots, etc. This may be sufficient to grow some kinds of trees, but for the orange tree the dose is not enough to secure more than a modicum of growth and if we wish product, the soil is what we make it.

This brings us to the fourth head, the all important question of fertilizing.

Now if one felt at sea as regards the question of cultivation of orange groves what is to be said with respect to that involving fertilizers? Even a careful preliminary examination of the answers returned under this head would seem to disclose conditions almost chaotic. Yet it must be borne in mind that these an-

swers are given by responsible and experienced grove managers who certainly would not act at random, and who must therefore, feel justified in pursuing the various courses that they followed. But their courses differ from each other in so many ways, and though their object must be identical, in the absence of the individual reasons for following them one feels constantly prompted to question, "Are they right?" and if not to wonder how much money, if not actually wasted, is spent unnecessarily on groves in Florida. The number of applications vary from five times a year to one, three times being the more common rule. While the times at which the applications are made, ingredients frequently varying with the season, appear to include, without actually naming, in all cases, every month in the year except July, August, September and October. The rationale of the application may be broadcast distribution or dosage to individual trees with quantity varying proportionally to twice as much for some varieties of fruit. Mixtures and ingredients also vary, the products of many known concerns being employed, and a good many home mixtures used. The old and well known materials in a few cases, perhaps, hopefully, giving way to those of late production. Thus Thomas Basic slag appears in a few instances and pulverized limestone is applied on one grove with results declared to be good. The functions of the various ingredients and chemicals and their relation to plant life are not uniformly clear. Oddly, perhaps, in Florida, the use of pulverized rock phosphate, one of the cheapest forms that can be used, the value of which has been determined elsewhere for various crops; and are of the best to let remain in the ground, does not appear at all. This was once believed to be practically inert, but when pulverized it is a cheaply available fertilizer. When all is said and done, the wish to ask, Are they right? is found to be persistent. There is a relatively right and wrong course in this as with regard to mere culture, but in this case it is a matter that runs into money. Who shall steer us aright and say what to do and how to do it?

It is more or less plain that, no matter what practical advantage broadcast fertilizing may have it can be pursued profitably only in such groves as have trees nearly uniform in age, distance, variety, productiveness, etc., such groves are not numerous, and an individual dosage, meeting the wants of shy as well as steady bearers, variation in size, age and demand is the more logical plan. But really the question hinges most critically upon two points, the best time or times to apply fertilizer and the best condition to apply in. Some years ago Mr. Bielby, I think, brought before the Society the question of the possibility of reaching the forces of the tree at a particular stage so as to affect its growth by a possible change of future leaf buds into bloom buds. He advocated application of fertilizer with respect to the tree's dormant period about which time its growth phenomena for the

coming season were decided. This seemed a rational proposition and would make say November a rational time for fertilizing. Why is it not a good idea? It has probably been forgotten, but may deserve to be recalled, since it follows out what is done in a greenhouse by artificial means to secure better bloom, and what is an orange grove, but an outdoor greenhouse? Bearing this fact in mind simplifies the understanding of a good many grove operations.

The second important point is the condition of the ingredients put on. It is desired to effect a certain purpose definitely at or about a certain time. Should our fertilizers be soluble or insoluble? On this point especially hangs the question of money, and it is particularly desirable that it be made entirely clear. No grove manager, no association of managers can give prompt solution to this problem. It is one requiring time and work both in the grove and in the laboratory. The reason for these statements may be briefly pointed out. It has long been known, though now-a-days seldom adverted to and hardly ever heard of by horticulturists, that when a soluble fertilizer is applied to a soil, the two, and perhaps the growing plants interact with the result that the fertilizer reverts to a less soluble or comparatively insoluble form, so that a considerable part of it remains for a long time comparatively unavailable to the plants it is meant to enrich. This was determined in probably heavier soils than most of ours and they may act more quickly in the way just described. But how soon do our soils act thus, if at all? This should be promptly determined so that we may know in what form and condition to spend the money in the best way, not perhaps, put into the soil material already represented, or in a state that plants will not soon avail themselves of. Until something is known of this with reference to Florida soils a grove manager cannot put his money advisedly where it is most useful to him and his interests. In this situation as well as in others already noticed, the Society should either take or order the initiative, and thus get the grove management as nearly as possible into the ranks of the exact sciences, even failing this the effort would be something good and helpful.

The fifth head deals with matters in the line of frost protection. First and last this is largely a topographical as well as an individual question, as shown by two of the answers, where water frontage is relied upon to avert the danger from frost. There are places where it pays to use protection, though the kind of protection varies a good deal. There being in use several different makes of heaters and smudge pots besides firing with wood and coke.

Of the 23 responses regarding the employment of frost protection 5 were in the affirmative, with two doubtfully inclined, while fifteen were unmistakably negative with none in the doubtful class. This matter of grove management

through the measures instituted and dwelt upon have received in the judgment of your committee a start with some impetus in the way of results that were in some cases unexpected and that seem to point the way to more correct, hopeful, economical and uniform practice within certain limits. It should now be let go, but if the Society takes it up and settles the doubtful points it is urged to do, its sphere of friendly wisdom will bring many a one to look upon it as a benefactor.

SOIL	IMPLEMENTS, METHODS AND TIME OF CULTIVATING GROVES	HUMUS PRESERVATION AND LEGUMES GROWN	Fertilizers, Formulas, Time of Applications and if Applied Broadcast or to Individual Trees and Seasonal Changes in Formulas Applied	FROST PROTECTION
(10) High Pine	Cutaway Harrow, acme harrow and weeder. Uses cutaway in fall, acme February to June, about every 10 days. If ground clean weeder	Sow beggar weed, cut first bloom, also when seed is ripe in fall	Three times a year, Nov. 1, Feb. 1, June 1, Mapes Fruit and Vine, Mapes Orange Tree and Mapes Fruit and Vine, respectively. Apply to individual tree, 40 to 60 pounds, annually	Hamilton Heaters
(4) High Pine	Turning plow, cutaway and common smoothing harrow. Turning plow November, cutaway, etc., at other times. Clean cultivation from November to June, allowing grass and weeds to grow remainder of year to shade ground and provide humus. If growth light turn under whole crop but if heavy mow it and then turn under stubble	Grass and weeds allowed to grow and then if heavy cut and turned under, if light turned under	Three times, Nov. 3, 10, 13; Jan. 6, 6, 6; May 3, 6, 10 Individual tree	No
(19) High Pine	Cultivator and Acme Harrow uses them to cover fertilizer and conserve moisture. March to July frequent shallow cultivation.	By growth of grass and weeds during summer. Grew beggar weed when trees were small	Three times, 20 lbs. Thomas' slag once a year and nitrate potash 3 times a year, distributed by acre. Change of formulas made according to apparent needs of trees	No
(20) High Pine	Cutaway, Acme and Mowing Machine. Early spring cutaway, then follow with Acme to level ground, then mow when grass is high enough to cut	Mow grass and weeds and allow them to rot on ground, no legumes	Generally three times. Formula varied according to needs of trees and quantity applied to each tree	Coke Fires
(17) Red clay 4 ft. down, High Pine	Disc and Acme harrows, Jan.	Beggar weed and crab grass.	Twice each year, about same	

enough to cut				
(17) Red clay 4 ft. down. High Pine	Disc and Acme harrows, Jan. 15 to rainy season and Sept., Oct. and Nov.	Beggar weed and crab grass. Velvet beans in young grove	Twice each year, about same formulas as Mapes Orange Tree, lessening ammonia on account of having legumes in grove. Apply broadcast in old groves, around young trees beyond tips of branches	
(18) High Pine and Oak	Plow and Acme Harrow. Use plow in Nov. about 2 to 3 inches deep, and Acme Harrow from Feb. 1 to July 1 each week or 10 days	Heavy cover of crab and crow foot grass, no legumes	Three times, does own mixing, Sulph. Am. (some nit. of soda in spring), Acid Phos. and S. of Pot. Increasing ammonia or potash for growth or wood, apply as needed	No frost since 1905. Fired then with lightwood
(16) High Sandy Ridge, originally covered with spruce pine, turkey oak and myrtle	No cultivation. Mow down grass late in fall, cultivation here makes too much rusty fruit. Mowing machine only implement	Mowing down grass and hauling weeds and grass from other cleanings (grows velvet beans)	Five times, Dec. Potash, Mar. nitrate of soda, April basic slag, May nitrate of soda, June nitrate of soda. Distribute by acre, uses wagon distributer	No
(21) Almost every kind, but mostly 1st class pine	Mowing machine, mulch wagon and scythe	Uses fine muck and any trash available and grows a little beggar weed	Once, midwinter, active ammonia to give trees a start for bloom and a fixed amount of potash and phos. acid. Applied by the tree.	No
(22) High Oak Land	Plow and cutaway harrow & acme harrow. Keeps clean all spring to June and then let go	Let everything grow in summer then mow, make what hay I want and turn everything under in fall	Twice, Jan. 15 and June 1. If very dry spring give nitrate soda in Feb., apply to individual trees. No difference made in formulas, except to trees budded on sweet orange stock need more fertilizer and ammonia than on rough lemon	No
(5) Medium High Pine	Plow, cutaway and acme harrows. Plows in Dec. or Jan. and harrows every 2 weeks to July	By turning under summer's growth. Some beggar weed in young groves	Twice, Dec. and May. Formulas not given as they are varied according to need of trees. By acre in old groves and by tree in young	No

SOIL	IMPLEMENTS, METHODS AND TIME OF CULTIVATING GROVES	HUMUS PRESERVATION AND LEGUMES GROWN	Fertilizers, Formulas, Time of Applications and if Applied Broadcast or to Individual Trees and Seasonal Changes in Formulas Applied	FROST PROTECTION
(2) Medium Pine	Plow twice a year	After cultivation ceases in July we mow grass over 3 or 4 times before Nov., allow cut grass to lie. In November it is thoroughly chopped up with cutaway harrow before plowing	Twice, by acre, 2 tons to 3 acres	No
(4) Yellow Sand Hickory Ridge	No cultivation this year	Allowing grass and weeds to make humus	Three times, 4, 6, 10, 10 per cent less Am. in fall, applied by tree. Sulphate of Am., Dis. Bone Blk., H. G. S. of P., 10 lbs. each	No
(23) 3 acres snuff colored loamy soil. 8 acres scrub ham	Hoe, mowing machine, cutaway springtooth and acme harrows, then follow with cutaway, acme and mowing machine. Hoe twice a year around trees and flat weed 3 acre grove	By turning under grass and weeds and when not enough mulching. Failed to get beggar weed and velvet beans to grow	Twice, December and late May 4, 8, 12. Uses larger percentage of Am. in Dec. I per cent more and less potash. Gives twice as much to grapefruit and tangerine trees	Smudge pots but have not had to use
(12) Low Pine Flatwoods	Mowing machine and scythe. No cultivation	No legumes grow, grass and weeds allowed to rot	Three times and most years four, materials nitrate of Soda, nitrate potash, basic slag each applied separately. Distributed to individual trees at proper seasons	No
(8) (Jupiter) Medium low Pine land	Hoe, using grass and weeds after hoeing as mulch. Light hoeing three times. spring, summer and fall		Three times. To the individual tree	No
(6) Clay Subsoil Flatwoods	Mowing machine, cutaway acme and hoe oranges roots near surface. Early winter cutaway harrow, harrow and hoe in May. Mowing machine in summer	Legumes furnish too much organic nitrogen. Cut grass and weeds	Twice, Dec. or Jan. and May. Vary potash and nitrogen according to condition of trees. Usually more nitrogen in winter and less in May	St. Johns River and bank, small trees
(7) High Hammock	Plow, cutaway, acme harrow.	No legumes, gets humus from	Two or three times, spring	No

	row and hoe in May. Mowing machine in summer		May	
(7) High Hammock and Pine	Plow, cutaway, acme harrow. Plow November and harrow up to rainy season	No legumes, gets humus from grass and weeds	Two or three times, spring, summer and fall, according to needs of trees. Spring increase percentage nitrogen, fall increase percentage of potash. Lime as needed	No
(3) High Hammock Clay Subsoil	Plow disc, acme, mowing machine. Plows as light as possible one way, then disc each way, then follow with acme to rainy season then mow and save hay. Generally commence after middle February, danger of frost past	Turning under grass and weeds. No legumes	Twice, spring and fall, 20 lbs. to tree 3, 9, 8, November application and same amount in spring 4, 8, 12, according to size of tree	No
(11) Hammock	Cutaway and acme harrows, cutaway fall and spring and continues harrowing in Oct., March, April and May	Beggar weed, crab grass and Natal grass	Once, nitrate of potash and Thomas' slag. Applied according to size of tree, no difference in formulas	None, miles of water front (Lake Harris)
(9) Low Hammock to Spruce Pine Scrub	Mowing machine, hoe and acme harrow. Hoe except on young grove on light land, there plow and harrow because soil is shallow. Dieback easily brought on and principally because this method produces bright fruit	By letting all weeds and grass possible remain on land. Beggar weed on light soil, cowpeas on young grove	Three times November 2, 10, 12; January, 25th, 5, 6, 7; May 25th, 3, 9, 12. H. G. S. of P., N. of Pot. H. G. S. of P. Nit. Soda S. of A. Basic slag N. of P.	
	Hoe main grove in fall after rains are over and ground is cool, again in Jan. with very few light harrowings. Mowing machine rest of year		Broadcast by acre on trees over four years old about 3-4 of amount. Personally add to separate trees. Give grapefruit double oranges, also tangerines, but for tangerines use partly dried blood or nitrate of soda	No. Intend to try Skinner System

SOIL	IMPLEMENTS, METHODS AND TIME OF CULTIVATING GROVES	HUMUS PRESERVATION AND LEGUMES GROWN	Fertilizers, Formulas, Time of Applications and if Applied Broadcast or to Individual Trees and Seasonal Changes in Formulas Applied	FROST PROTECTION
(13) Stiff low Hammock	Hoe, plow, mowing machine, cutaway. Hoe once in spring, plow in fall and harrow middles in spring up to rainy season. Mow and mulch balance of year	Grow grass and weeds and cut down and allow to rot on ground	Two, sometimes three times, apply according to size of tree	Wood Fires
(1) Flat woods, pine and moderately low hammock	Hoe and cutaway in winter and spring, as shallow as possible, as roots come to surface	Crab grass and anything that will decay	Once a year, broadcast and on young trees to each tree	No
(15) Hammock	Cutaway and double extension acme—cutaway. Harrow in fall and 1st cultivation in late winter and then acme harrow to get shallow work. Harrow till rains commence then mow when grass and weeds require, letting same lie on ground except last cutting saved for hay. The double extension harrow extends under trees and leaves little for hoe. Does first class work	Discontinued planting peas as they seemed to be harbor for insects, and velvet beans as they were hard to handle in fall	Three times, February or early March 4, 6, 12; May 2 to 4, 6, 12; November 8, 12. Sulphate of ammonia, S. of G. potash and acid phos. and Thomas' phos. & potash in fall and as we had used sulphate of potash many years we began using fine-ground limestone three years ago, one ton to acre each year with fine results. Fertilizer broadcasted but quantity regulated according to size of tree and crop as far as can. Most of ammonia in late winter, none in fall	Small size Troutman heaters and have tested them enough to feel that oil heating is practical only one must have large size pots so as to burn practically through cold snap. With large acreage it is practically impossible to get help to refill pots while cold is on. It is disagreeable work anyway, even with double pay they won't do it. Expect at some time to get larger pots. Storage room for oil necessary and a larger pot would serve as storage. The most desirable heater would be one that burned oil uniformly and not from top, only as this uses up the best part of oil in early part of night leaving residue of less heating value to burn towards morning, when cold is more intense. One pot to tree.

NOT WHOLLY CLEAN OR WHOLLY GREEN

Prof. J. Willis Westlake
LAKE HELEN, FLA.

Mr. President, Ladies and Gentlemen:

The subject assigned to the committee to which I have the honor to belong is "Methods of Handling Citrus Groves." I am glad that the plural, *methods,* is used, for there are and must be various methods, depending on the different varieties of soil and climate. The methods applicable to hammock groves, for example, are very different from those adapted to pine land groves. My practical knowledge of citrus groves is confined to the pine land groves of Volusia County; but the culture adapted to these groves will apply, with slight modifications, to pine land groves everywhere

That word "handling," from the verb *to handle,* means managing, and seems to limit the scope of our inquiry. It does not seem to embrace the location, planting and building of groves, but presupposes their actual existence. It reminds me of the celebrated receipt for cooking a hare, given in an old cook book. It begins, "First catch your hare." So we must first catch our grove before we can handle it.

I take it that this meeting is somewhat like what our church people call an "experience meeting." Our committee have not been able to meet and agree upon a comprehensive report, so I shall make an individual report, giving my own methods and the results of my experience.

Most of our Volusia County groves are situated on rolling, or high pine land, though there are some rich hammock groves, especially on the margins of our beautiful lakes. My own grove overlooks one of these lakes—pretty Lake Helen. The land is of an excellent quality, the soil, to a depth of several inches, being of a dark gray color, showing that it contains a good percentage of humus. Here I located twenty-six years ago, and here by personal experience, I learned what little I know about handling citrus groves.

As to the actual working of my grove, I suppose my method is about the same as that of most growers. I practice not wholly "clean culture," nor wholly "green culture," but what may be called green-clean culture; clean during the dry spring months, and green during the rainy season. I plow my grove once, and once only, preferably in the fall, about the first of October; but sometimes I postpone it till January—the time of the first fertilizing. I prefer October for the reason that the vegetation, whatever it may be, is then mature, and if turned under will rot in the ground during the winter and be in a condition to assist the trees in making their spring growth. If left on the ground, much

of it will be dried up, blown away or otherwise wasted. The plow, in any case, should be run as shallow as possible. Many growers fertilize before plowing; but I prefer to fertilize *after* plowing; spreading the fertilizer on the furrows, and working it in with an acme or a cutaway harrow. The plow buries the fertilizer too deep. For all the other workings, unless the ground is too grassy, I use the cutaway harrow. If I want to subdue the grass or weeds, I use the Planet Junior cultivator. During a dry season the grove should be lightly worked about every ten days, so as to close the pores, so to speak, and conserve the moisture. This is what is called "dry farming." It draws the moisture up from the deep subsoil by capillary action, so as to bring it within reach of the thirsty feeding roots. I am not anybody's agent, but I want to tell you about a new cutaway that I bought a few weeks ago. It is called the "double action cutaway," and consists of four gangs of notched discs instead of two. The forward gangs are set so as to throw the earth outward, as in the old style. The rear gangs are set so as to throw the earth in the opposite direction, and the discs track between the forward discs, thus breaking up every inch of ground. The gangs are easily controlled by means of levers, and there is a hinged pole, so that there is no weight on the necks of the horses, and the machine runs perfectly level. You may get any size, from twelve discs up. Mine is a 16-disc harrow—four gangs of four discs each—with a cut of 4 1-2 feet, which is about the right size for any ordinary 2-horse team. It is just the thing for grove work, and when it becomes better known will doubtless supplant all other harrows for such use.

I generally hoe the trees twice a year; in the spring, about March, and in the fall, at the time of last working. Hoeing, as often done, is of but little use; the hoer scrapes the ground under the trees and draws the weeds and grass, mixed with surface soil, out so as to form a circular ridge, leaving the ground as hard and smooth as a barn floor. The earth should be loosened up by a chopping motion of the hoe, so as to let in the rain and the air. The trash should be left to rot under the tree.

It is now generally agreed that the ground should be shaded during the hot summer months, either by its natural covering of grass or by some "cover crop." It is a maxim that "Nature abhors a vacuum." It may also be said that Nature abhors the bare ground. A Florida poetess has said that God sends His angels to sow flower seeds in all bare and unsightly places..

> "For where no corn may flourish,
> Always His angels nourish
> The flower beds of God."

These angels come "on the wings of the wind," and some of them, I suspect, take the form of birds.

If there is a heavy growth of grass, it may be mowed and cured for hay; the fallen leaves, short grass and stubble will be as much as can well be

turned under. Whenever during the summer the grass seems to be encroaching on the trees, I have a man go around the trees with a scythe. In such cases mowing is better than hoeing.

If the trees are not too large, a so-called "cover crop" may be planted in the middles. For this purpose the legumes are recommended, as they are good nitrogen gatherers and add humus to the soil. But velvet beans in a grove are a nuisance. They are too rampant. You have to go through the grove every two or three days and pull the vines out of the trees. Three or four rows of cowpeas may be planted in each middle, but additional fertilizer should be applied to prevent the robbing of the trees. Desmodium, beggarweed, is probably the best cover crop. The seed may be broadcasted the first year, after which it will proagate itself. If the soil is good, two crops may generally be grown. The first may be mowed before seeding time, for hay; the second may be left to go to seed and afterwards allowed to decay on the ground or be turned under.

In my own grove, there is but little room for a cover crop. My trees are twenty-five feet apart, are low headed and have a spread of some sixteen or eighteen feet; so there is barely room for a hay wagon to pass between the rows. The lower limbs are about eighteen to twenty-four inches above the ground. Limbs that droop so as to touch the ground are supported by props. I am a firm believer in low-headed trees; the ground under them is always shady and free from grass, and about half the crop may be picked without the use of a ladder.

As to the treatment of diseased trees, spraying for insect pests and all that, there is another committee to which these are referred, and it becomes us to be modest in the presence of our learned Gainesville professors. I will say, however, that I have not found it necessary to do any spraying since the big freeze. That terrible insect pest, the whitefly, has not yet made its appearance, but it is coming. It has attacked our town at two vulnerable points; on the north, coming from DeLand by carriages and autos, and on the south and east, coming by rail from the East Coast. But "sufficient unto the day is the evil thereof," and I will not go to meet the enemy.

Before leaving the subject of grove working, I will say that some growers work their groves too much. They keep working and worrying their trees nearly all the time; keep them excited, so to speak, so that they are unable to eat their meals in peace and quietude. You see I am using figurative language. I can't help thinking of my trees as persons, and sometimes I amuse myself by drawing parallels between men and trees. They have life, as we have—plant life. How it originated and how it differs from animal life we do not know. If we are cut we bleed; so does the tree, but the blood is clear and we call it sap. We breathe, and so does the tree; but its lungs are on the outside, the leaves. And how about the senses? Do they

feel and see and hear and smell? A question more easily asked than answered. When I cut a flower and the blood or sap follows the knife, I sometimes wonder whether the plant feels the hurt. Now suppose I drop a potato on the earthern floor of a vault or cellar. It is dark, except that there is a small knot hole in one corner through which a ray of light enters. In a few days the tuber will put forth white silken sprouts which reach eagerly toward the speck of light. What draws them? Do they see? And again, suppose you bury some choice plant food in your grove. Examine it a week or two later and you will find that the rootlets or feeders of the trees, silently creeping, creeping through the dark and silent earth, have found it and are eagerly devouring it. What directed them to it? Did they smell it? I don't know. Do you? Does anybody? It curiously happened that after formulating these questions in my own mind, I saw an article in the April number of "Current Literature," under the title "The Eyes of a Plant," in which it is stated that a great German botanist named Haberlandt, of the University of Graz, has actually discovered that plants have eyes; that the epidermal cells contain lenses which give distinct and proper images, just as the eyes of insects do. The plants may not consciously see things, but the eyes are there all the same.

"There are more things in heaven and earth, Horatio,
Than are dreamt of in your philosophy."

The most important thing in the handling of citrus groves, namely, fertilizing, I have left for the last. The scientific aspects of the subject I shall not discuss, as there is a standing committee on fertilizers, of which the eminent scientist, Prof. Blair, is chairman. I have some views on the subject, based on my experience of twenty-six years, which I believe to be important. I have not been able to consult my colleagues on the committee, and don't know whether their views coincide with mine or not, so I give my method as a personal matter and accept the responsibility. Owing to the absence of another committee, our report was called for on Tuesday, out of the regular order. I was not able to be present at that time, and so informed our worthy president, but I am glad to know that one of my colleagues, Mr. Edwards, of Zellwood, was present, and presented an interesting report.

I call my method the *Common Sense Method,* because it is free from scientific technicalities, and deals only with such things as the unscientific grower may see and understand. There is no subject connected with orange culture that is so little understood as fertilizing. Many growers, even old growers, fertilize in a haphazard way, using the wrong fertilizer at the right time, the right fertilizer at the wrong time, or the wrong fertilizer all the time. In this way tens of thousands of dollars are wasted, or worse than wasted, every year. On the representation of interested parties, growers have been led to believe that the crop is in proportion to the amount of fertilizer applied; the more fertilizer, the more fruit; so they reason that if ten pounds per tree is

good, twenty pounds is better, and forty pounds best of all, and order accordingly. But here a fallacy comes in. No allowance has been made for waste. The appropriation and assimilation of plant food is a slow process, and no ordinary tree can take up more than about ten pounds at a meal; that is in the time that food is within reach. I suppose that owing to rains, winds, etc., very little of the fertilizer remains at the end of three months; so that if we apply eight hundred pounds to an acre in January, expecting that it will last until June, the trees will have three months of feasting and three months of famine; four hundred pounds having been taken up by the trees, and four hundred pounds having gone to regions unknown. The proper way would be to make two applications of four hundred pounds each. You thus double the value by saving the loss. At the meeting of this society in 1906, Prof. Blair, in an interesting paper on "The Loss of Palnt Food in Sandy Soils" (Proceedings, page 74), stated that he was "strongly inclined to the belief that it would be economy to fertilize pineapples four to six instead of two to three times a year"; and he further gives it as his opinion "that 2000 pounds of fertilizer applied at intervals of two or three months would be as effective as 3500 pounds of the same material in two applications." This is confirmatory of my opinion that we should fertilize our trees four times a year instead of two. In the cases mentioned by Prof. Blair, large quantities of fertilizer were wasted; but in some cases it is worse than wasted. There is such a thing as over-fertilization. Intensive cultivation may do in some cases, but if carried too far it leads to disaster. To give a tree 40 pounds of fertilizer for a six months' supply is like giving a man a week's food for one meal; he may gormandize, and it will give him indigestion; so the tree may gormandize or take up more than it can assimilate, with a similar result—plant indigestion, or mal-nutrition.

I will now, as briefly as possible, explain my own method, a method which if generally adopted would save tens of thousands of dollars in fertilizer bills, add hundreds of thousands of boxes to our orange crop, and greatly improve the quality of our fruit.

About the middle of January, or about two weeks before the blooming season, I apply 400 pounds per acre—a ton to five acres—of a fertilizer analyzing about 6-6-6 (the figures are here used to denote percentages, and in the usual order, ammonia, phosphoric acid, potash), the object being to give the trees a good send-off after their winter sleep, and to bring out the bloom; and it generally has the effect intended.

And right here many growers, even old growers, make a grievous mistake. They have read in all the fertilizer booklets, and have put it down as law and gospel, that fruit and vine analyzing about 2½-8-13 is the proper fertilizer for bearing trees, and they insist on using it all the time, even in the spring, when trees don't need much

potash, but do need ammonia, and a good deal of it.

On this subject I beg to quote from a letter written to me by a gentleman who has devoted almost a life time to the subject of fertilizing, and is himself a successful manufacturer of fertilizers. He says:

"There are still a great many growers in the state who insist on using the fruit and vine formulas the year round. They are simply potash crazy, and have the trees all tied up so that there is no sap flowing in them at all—small leaf growth, small oranges, and the trees just starving, as you say, for a little of the absolutely essential plant food in the shape of nitrogen."

Fruit and vine *is* good for bearing trees, but not as a steady diet, except, possibly, in some low hammock groves that are rich in humus and in natural sources of ammonia, and deficient in potash. It has been shown by analysis that in the production of a crop of oranges there are required for roots, wood, leaves and fruit, nearly equal quantities of ammonia and potash. (See Press Bulletin No. 138, Ag. Exper. Sta.) An approximate estimate is, for an acre of bearing grove, am. 120 pounds, potash 125 pounds. Now suppose we apply to this acre 1,600 pounds of fruit and vine fertilizer in a year. This will contain 40 pounds of ammonia (2 1-2 per cent), and 200 pounds of potash (12 1-2 per cent.)—five times as much potash as ammonia. How can we expect healthy groves under such conditions? A larger percentage of ammonia should be used, especially in the spring, when trees are in a somewhat exhausted condition from the production of their crop, and a strong stimulus or tonic is required for the production of wood, leaves and blossoms.

About three months later, in March, I apply the same quantity of fertilizer analyzing about 5-7-8, but generally of a slightly different composition, the special object being to continue the spring growth and to enable the trees to hold their fruit. This will carry the trees on till June, when I apply a mixture analyzing about 4-8-10, the object being to continue the wood growth and begin the ripening process.

Three months later, about the middle of September, I apply the same quantity of a regular fruit and vine brand analyzing about 3-10-12, the object being to prepare the trees for winter, and give sweetness and flavor to the fruit. It will be observed that in this scheme there is a gradual decrease of ammonia from 6 to 3, and an increase of potash from 6 to 12. In ordering fertilizers, I consider not only the analysis, but also the sources of the elements used. I will not order any brand until I know what it is made of, and if I cannot find what I want, I have it made to order. We sometimes see in fertilizer books, "This is a purely chemical fertilizer." I do not want that kind. It may do for hammock groves, but it is not good for pine land groves. It tends to impoverish the land. I am not afraid of a little organic plant food. For phosphoric acid I prefer bone, lots of it, or Peruvian

guano. The nitrogen may be obtained from several sources—nitrate of soda, sulphate of ammonia, dried blood, bone, etc., but not sulphate of ammonia alone. It is not good for pine land groves, unless preceded or followed by basic slag or some form of lime. Last year I used the slag, applying it in December, a little while before the spring fertilizing

The use of 25 pounds a year for each tree may seem to some growers a beggarly amount; but it is not. It is four tons to five acres, and I have never used more than that, even on trees bearing ten to twenty boxes each. But it must be remembered that I have an excellent quality of land. On lighter and poorer soils more may be required, say 500 pounds per acre. *The result is what tells;* and in my case it has been very satisfactory. A friend of mine, president of a fertilizer company wrote me some time ago that the results I obtained from such a small amount of fertilizer were *truly wonderful.* "Why," said he, "I know lots of growers who use 80 to 100 pounds per tree, and don't obtain half the results that you do."

Some may object to fertilizing in September. Of late years it has become almost a rule to fertilize groves in November. The plan was invented, I suspect, by a New York fertilizer house, and the other houses soon caught on. Its object was to give them business during the slack time between June and January. Now I am heretic enough to believe that the practice of fertilizing in November is wrong. That is the very time when the trees want to be let alone. They are sleepy, and are just about to take their winter nap. The fertilizing is too late to benefit the present crop, and too early to benefit the next. We are told that "the roots go on growing during the dormant period." I don't believe it. You can't have root growth without top growth, and that is just what you don't want at that time.

In conclusion, I will say that the method outlined above is not only a common-sense method, but a scientific method. True science does not contradict common sense. It is not a new thing; it has been tested by experience, and I am very sure that if it were adopted by our growers generally, modified, if need be, to suit present conditions, it would give them healthier and better trees, diminish their expenditures, increase their income and improve the quality of their fruit.

HOW TO CULTIVATE

Judge Wm. C. McLean

Mr. President, Ladies and Gentlemen:

Owing to the fact that I will not be present at your meeting to be held at Miami, I forward this communication. I regret exceedingly my inability to be present, and to renew pleasant ac-

quaintances made in the years gone by.

I am expected, so I am informed, to tell you "How to Cultivate an Orange Grove." I shall not undertake to do this, but shall content myself in telling you how I have cultivated my own grove.

Let it be borne in mind that my land is what is known as high pine land. For the past twenty-five years I have grown oranges in Florida for profit, during which period I have pursued many different methods of cultivation; and after having tried first one plan and then another, I am satisfied that the best way to cultivate a citrus grove is as follows:

I will begin at the close, not of the calendar year, but at the close of the growing period of an orange tree—at that time when the tree goes to sleep, in other words, its hibernating period.

Between November 15th and December 15th the grove should be fertilized, and it should receive at this time its heaviest and largest application of fertilizer. The fertilizer should run low in ammonia and high in potash—say two and one-half per cent. of ammonia and six to seven per cent. of available phosphoric acid, 12 per cent. of potash K_2O, made from sulphate of ammonia, acid phosphate and high grade sulphate of potash. Until within the last eight or ten years I used as a source of phosphoric acid, dissolved bone or dissolved bone black, but I came to the conclusion, that although I paid for this material, which generally costs about $3.00 or $4.00 a ton more than acid phosphate, I did not always receive the dissolved bone, but most generally obtained the acid phosphate. The chemists tell us that it is difficult, if not impossible, to tell whether the base of a fertilizer is dissolved bone or acid phosphate; and further, that phosphoric acid, whether it comes from bone or acid phosphate or any other substance, is the same. In other words, phosphoric acid is phosphoric acid. Immediately after applying the fertilizer I turn *it under with a plow;* in other words, give the grove a *thorough plowing,* breaking up the little feeders which are annual, turning under all of the grass and weeds and other vegetable matter on the ground, thereby putting into the ground what is called humus, which is the life of the soil. After the grove has been plowed I then run over it with an Acme harrow, so as to make the grove as smooth and level as a billiard table. As said above, this should be done between November the 15th and December the 15th; but care should be taken not to turn under any green stuff, for this produces sourness. After the grove has been cultivated as above described nothing should be done with it; but on the other hand let the trees alone, so that they may go to sleep and gather strength for the burdens of the ensuing year. While the trees are apparently in a dormant state, yet the roots are taking up the fertilizer and storing it away so as to draw upon it when they feel the first impulse of the new year. Between the 25th of January and the middle of February I then give another application of fertilizer, which runs high in ammonia and low in potash. This fertilizer analyzes five per cent. of ammonia and six per cent. of available phosphoric acid, and five per cent. of potash. Very little potash is needed at this season of the year, as potash enters very minutely into the

formation of either wood or bloom or fruit at this time of the year; but a great deal of ammonia should be applied at this time, as this is the most desirable element of fertilization at this season, entering largely into the formation of wood and causes a vigorous, healthy bloom. The source of ammonia should be about one-half nitrate of soda, and the remaining moiety sulphate of ammonia. The nitrate of soda is quick acting, and by the time the nitrate of soda is exhausted the sulphate of ammonia begins to play its part, and carries the tree, the bloom and the fruit till the next period of fertilization. At this season of the year I turn the fertilizer under with a two-horse disc harrow on wheels. This disc harrow can be used so as to force it into the ground at any depth, from a quarter of an inch to four inches. At this time there are no grass or weeds on the surface, and the disc harrow should be run lightly, just deep enough to turn under the fertilizer. After the fertilizer is turned under with the disc, the Acme harrow should then be run so as to smooth and level the ground. When this is done no further cultivation is done to the grove, except to hoe the grass, until about the last of March, when the Acme harrow is used constantly from that time up to the time when the rainy season begins. The object in keeping the Acme harrow constantly in use is to preserve and conserve the moisture in the ground. During the dry period in Florida the sandy soil becomes full of little holes, and each of these holes is a chimney out of which the sun pumps the moisture. By stirring the soil with the Acme harrow the formation of these little holes, or chimneys, is prevented, and thus the moisture is kept in the ground. About the 20th of May fertilizer should be again applied, running about three and one-half per cent. of ammonia; six or seven per cent. of available phosphoric acid, and ten to twelve per cent. of potash, K_2O. I turn this fertilizer under with a two-horse disc cultivator on wheels, and then run the Acme harrow over it to level up the soil. By this time the rainy season begins and no further cultivation is needed, except along in September the grass and weeds should be mowed and permitted to lie and to rot upon the ground. This is the method of cultivation which has been pursued by me for many years, and I am satisfied, after having tried the different methods, that this is the best way to cultivate an orange grove situated upon high, pine land.

I have said nothing relative to hoeing the trees. Of course the trees should be hoed. No grass should be permitted to grow under the tree, and generally about three hoeings a year are sufficient. In this connection I desire to emphasize the fact that when I say "hoeing," I do not mean *simply to scrape* the ground under the tree so as to cut down the grass and the weeds: but the tree should be dug around and the *soil loosened* up so that not only water but air may get into the ground under the trees. Air is essential. The best tool to do this with is what may be called a potato digger; as we call it, a jumbo potato digger, which is a larger tool than the regular potato digger. By using this digger you can not only more readily loosen up the soil, but you are not so apt to scar the root of the tree as by

the use of a hoe. One of the most essential things to the successful cultivation of an orange tree is, not to permit the sand or dirt either to accumulate or to cake upon the roots. The crown roots of an orange tree should be left exposed and not be permitted to be covered with sand. To permit the sand to cake around the roots frequently causes a sore or blister to form upon these roots, and this may lead to a disease which is either *mal de goma* or some other kindred disease. I have made it a practice for many years in the spring of the year to have the roots of my large trees scraped for a distance of eight or ten inches from the trunk with a wooden paddle. To do this it will not do to use an iron tool, because the bark of the tree will be injured; but the best thing to use is a piece of soft pine or any other soft wood.

As to pruning, Thomas Jefferson said that the best time to prune a tree is when your knife is sharp. My experience has been that the pruning should be done between the first of November and the first of February—at that period when the tree is dormant, though I would not hesitate to prune any season of the year when the tree demands it. Whenever a limb of any size, even a branch the size of a man's thumb, is cut off, a good, heavy coat of paint or tar should be at once put on the place. This prevents decay.

I have heard a great deal about clean culture and no culture. In my judgment, neither is advisable, but on the other hand the method described above is the best. There is nothing in nature known to me that responds so readily to cultivation and fertilization, and at the same time, there is nothing that shows so quickly the want of either, as a citrus tree. To make an orange or grapefruit grove requires both cultivation and fertilization, and as "eternal vigilance is the price of liberty," so steady, constant, intelligent work is necessary to the successful making of a citrus grove.

I will close by stating that I have an artesian well in my grove and from this well I obtain water for irrigation, and I use for pumping purposes a two-stage centrifugal pump and a twenty-horse power gasoline engine, throwing about 300 gallons per minute, conducting the water through the grove by means of four-inch iron pipes, with hydrants every fifty feet; but as I am not expected to discuss the question of irrigation, I refrain from saying anything further on the subject.

In conclusion. The A B C of cultivation is a thorough plowing in the fall of the year and the constant, steady use of the Acme harrow in the spring of the year, beginning just before the dry season commences and continuing till the rainy season begins.

DISCUSSION

Mr. Wakelin: It is a good paper and most of the growers here will agree to most that was said. But I think there is one statement there that most of us will take exception to, and that is that phosphoric acid is phosphoric acid, whatever the source. Of course, if you consider that it is *pure* phosphoric acid, that is true, but we do not put *pure* phosphoric acid on our trees. We apply it in different forms, that create different conditions, such as acid phos-

phate, slag, dissolved bone black, etc. You might as well say ammonia is ammonia, no matter whether you get it from the sulphate, blood, bone or any other form. We get very different results by putting on the different forms of these plant foods. I disagree with the statement and contend that phosphoric acid in one form will not give a result exactly like phosphoric acid applied in another form.

In that connection, I might perhaps tell the result of the testing of the soil around the trees that had been receiving the standard amount of fertilizer; that is, six pounds of fertilizer made up of sulphate of ammonia, acid phosphate and high grade sulphate of potash. A test was made of the soil around the trees and then at a little distance from the tree where none of the fertilizer had been scattered. The soil where the fertilizer had been used was twice as acid as the soil on which it had not been applied; that is, it would take twice the amount of lime to correct the conditions where the fertilizer had been scattered as in the soil that had been unfertilized. Where the soil had received more than the standard amount of fertilizer, the acidity ran up to three times as sour as where the fertilizer had not been used. That cleared up any doubt that where the sulphate of ammonia and acid phosphate are employed together, the sulphate is liberated and digested, with the acid phosphate a close second. My experience has been to get your phosphate from bone or guano and you will get better results and the trees are more healthy.

Mr. Skinner: I have felt for some years that there is something wrong with our fertilizers, or, rather, the use of them. There certainly is nothing wrong with the nitrogen and phosphoric acid and potash, because so far we have to use them, but whether the company they keep is the right company or not, is another matter, and whether the things we think they do is all they do, is another matter still. I have been reading up on fertilizer literature a little, trying to get some light, and among other books I got a French book (a translation), written by a manufacturer of fertilizers. It seems to me that Mr. Wakelin's remark is very apt, and the acidity of the soil close to the tree being caused by the sulphate of ammonia and acid phosphate, brought to my mind one statement in that book that was very interesting—that experiments conducted by some very prominent German chemists for a number of years show that where there is a continued use of potash salts, there is a deficiency of lime in the soil; that when the potash is taken up by the plants it makes soluble a certain amount of lime that passes off in the water. This is true particularly where the sulphates are used. It has been proved that wherever you use potash salts you have to use plenty of lime.

Last year I used some car loads of this lime rock, and since then I have been astonished, in looking up the subject, to see how rapidly the use of

ground lime rock is spreading all over this country.

I think, but I am not sure, that we have a remedy for a good deal of our trouble in the use of very finely ground lime rock. This acidity is not due entirely to the sulphate of ammonia, but due partly to the action of sulphate of potash.

Mr. Thompson: I would like to add one more word in regard to the use of lime. If you read any work on the uses of soils or chemical soils, you will find the subject of lime brought up very frequently. Our experience has been along this line: that we have gotten good results from the frequent applications of lime. Several years ago our grove had not been limed at all for a great many years. It showed that it was sour, and we applied caustic lime, or hydrated lime; that is, putting it on the grove in little piles and pouring water on it and then scattering it around the trees. Next year, we put on the ground limestone, and we have been doing that about every two years, and we shall continue to do that, feeling that it is one of the best things we are doing.

Mr. Foote: The paper we have just heard stated that in the spring of the year, the author used a high percentage of ammonia. We have employed that method where the fruit has been picked off the trees, but where we expect to hold the fruit, we delay the application of that high percentage of ammonia until late in the spring. We first put on a low percentage so as not to rush the maturity or development of that fruit. When the fruit has been picked, or is about to be picked, we use the higher percentages of ammonia, from 4 per cent. to 5 per cent. Again, we are trying a different plan of fertilizing, and instead of putting it on in two or three heavy applications, we are putting it on in smaller and oftener applications.

Mr. Dade: What time should the lime be applied, before or after the fertilizer?

Mr. Howe: In my opinion, the best time is when you can get at it and do it. Most people put it off and don't do it at all. I have seen good results from its application at all times.

Mr. Thompson: I believe that might apply to the stone lime. As I understand it, the carbonated lime, or ground limestone, will not affect the fertilizer, but hydrated or quick lime should not be applied for at least two weeks before or after a fertilizer containing either sulphate ammonia or acid phosphate.

Capt. Rose: I think the fact of the lime affecting the value of the fertilizer would depend entirely upon the amount of lime and the amount of soil and the amount of fertilizer. If you put on the lime and certain forms of ammonia at the same time, the action of the lime would liberate the ammonia in the form of a gas, which would be of no benefit to your trees. However, if you put on your fertilizer and then disked it in, and afterwards later put on the lime, I do not think the benefit of either would be lost.

Mr. Hart: I think if you put a sam-

ple of almost any of our chemical fertilizers and stir in a little lime and put on a little moisture, you will find that there is a very strong smell there. Therefore, it seems to me to be not wise to apply lime close to the time of applying fertilizer. I would advise some little time after the fertilizer is applying before putting on the lime. I do not pretend to put my opinion up before these gentlemen who study these things scientifically, but it seems to me there is an opportunity to make a mistake on this point.

Capt. Rose: As Mr. Hart says, a mixture of one of our complete fertilizers containing nitrates or ammonias, in conection with the lime, would immediately free the nitrogen as a gas. One should use his common sense in these matters. Perhaps the best way would be to put on his fertilizer and then in a week or two put on the lime.

Speaking about the lime, I want to speak of an observation made at our Citrus Seminar some two years ago. A chart was exhibited showing the analysis of the make-up of the tree, roots and fruit, and, much to my surprise, 40 per cent. of the ash of the plant the fruit and the root was shown to be lime. The other mineral constituents were very much smaller, and I am satisfied that we have bought thousands of tons of the Canada hardwood ashes for the potash contained in them, which was very small, and I am now satisfied that the good results obtained came from the lime.

Painter: Lime, in any of its alkaline forms, can be mixed with nitrate of soda or any of the nitrates, without loss of ammonia either before or after application to the soil. It is better to apply lime after the fertilizer containing sulphate has been put on, as it will neutralize any acids left by the sulphate.

Ornamentals—Bamboos

By H. Nehrling

"In Nature it is to form, far more than to color, that the fairest pictures owe their charm. You may have to hunt for a flower, but the grace of a Palm or a Bamboo springs into notice by itself."

—Lord Redesdale.

Mr. President, Ladies and Gentlemen:

Bamboos! What a world of beauty, elegance, grace, enchantment and poetry is combined in this one word. No other plant has such a grace, such a beauty of form, such enticing and everlasting charm. In my younger days, when longing for the tropics, illustrations of Bamboos, as growing in Ceylon and in India, impressed me deeply; but when I beheld for the first time the massive culms of Bambusa vulgaris, the interlaced masses of emerald-green foliage of B. arundinacea, the tall feathery shoots of Dendrocalamus strictus, and the indescribably graceful clusters of wandlike stems of B. argentea and B. alphonse Karrii among princely palms, large magnolias, masses of bananas, glowing hibiscus and numerous other tropical plants in the gardens of Florida, my enthusiasm became boundless. These masses of verdure, exceedingly dense and of an indescribable elegance, have no rival. They are entirely distinct from all other leaf-masses in the plant world. The stems were of all heights and the plants had no naked appearance at the base, the exterior culms arching over to all sides, while the central ones stood upright. There was a glamor of sensuous beauty in these Bamboo gardens, new, strange, bewildering. It was November, but even in those November days the sunlight was bright in this southland, the shadows darker than in my northern home, Wisconsin. It was a revelation to me. I could scarcely leave these sights of overpowering beauty and elegance.

And now in my older days I have Bamboos galore. My garden is full of them. They are planted in all available places. But though I have cultivated them for years the spell has not passed, the enthusiasm has not subsided. A beautiful clump of Bamboos sets me in ecstacy. A new species makes me wild with expectation. I never lose my interest in them. As the celebrated naturalist, Dr. Ernst Haeckel, says, "The enjoyments of nature have the immeasurable advantage over the enjoyments of art and other pleasures of life that they never tire, and that they always create a new sympathy in a sensitive mind, so that we always return to them with new and increased interest, and the older we grow the more intense these interests and enjoyments become."

The Bamboos belong to the most enchanting glories of the tropical world—they are likewise the glories of the gar-

dens of Florida. There is nothing that can compare with them in distinctness, in thrilling beauty and in picturesqueness. The palm is the prince of the plant world and the Bamboo everywhere is its close companion. Where we find the former we may look for the latter. It takes 10 to 15 and even 20 years to grow a palm into a fine tall specimen. The Bamboo is a very conspicuous object in a few years, and at the age of five or six years it forms an impressive feature in the landscape. It grows everywhere with equal vigor, and its demands on the soil and care are few and easy to satisfy. While the palm is an aristocrat, looking best in close proximity to pretentious buildings and in large park-like grounds, the Bamboo hides the small unsightly cabins and plain cottages and imbues them with as much beauty as the costly mansion of the wealthy. In parks clumps of Bamboos look exceedingly rich and indescribably beautiful. What pictures of refined beauty the landscape gardener would be able to create with these giant grasses in the large parks of our northern cities if they were available to cultivation there. But alas! they are not hardy and can only be grown successfully in our southernmost states and in California. Our southern parks and pleasure grounds should abound in them. They should be in every garden, at least one good specimen. Along lakes and streams they have no equal, their arching, wand-like stems hanging over the water in graceful masses. They look well as isolated specimens on the lawn, but they look better still in the foreground of noble evergreens, like Magnolia grandiflora, the Himalayan Cupressus torulosa and our southern red cedar. A bench under a large Bamboo is an ideal resting place after the day's work is over. And how charming it is when the glowing and graceful red-birds hurry through the green masses of foliage and stems, or when the jocund mocking bird pours forth its sprightly notes from the top of a tall clump. The iris is frequently called the "orchid of the poor"—with the same right we might call the bamboo "the palm of the poor." It often hides the most dilapidated shack with a verdure and grace that is simply wonderful. A large clump of Bamboo is always very conspicuous, very impressive. It creates a tropical effect even more striking than a palm. A large clump of Bamboo you can see at quite a distance. This is not the case with most palms, if we except groups of coconut and royal palms.

All the naturalists who explored the tropics never forget to mention the Bamboo, perhaps the most useful of all plants. Humboldt speaks with enthusiasm of them. Appun admired the masses overhanging the streams of Venezuela and Guiana. Martius and Spix praise their beauty in the Brazilian forests. Speaking of their overstepping the geographical tropics of China and Japan as well as northern India, Alfred Russel Wallace continues: "It is, however, within the tropics and toward the equator where they attain full size and beauty, and it is here that the species are most numerous and offer the variety of form, size and quality which renders them so admirable

a boon to man. A fine clump of Bamboo is perhaps the most graceful of all vegetable forms, resembling the light and airy plumes of the Bird of Paradise copied on a gigantic scale in living foliage. Such clumps are often 80 or 100 feet high, the glossy stems, perhaps six inches thick at the base, springing up at first straight as an arrow, tapering gradually to a slender point, and bending over in elegant curves with the weight of the slender branches and grassy leaves. The various species differ greatly in size and proportions, in the comparative length of the joints, in the thickness and strength of the stem-walls, in their straightness, smoothness, hardness and durability. Some are spiny, others are unarmed, some have simple stems, others are thickly set with branches, while some species even grow in such irregular, zigzag, branched manner as to form veritable climbing Bamboos. They generally prefer dry and upland stations, though some grow near the banks of rivers, and a few in thick forests, and, in South America, in flooded tracts. They often form dense thickets where the forests have been cleared away and owing to their great utility they are cultivated or preserved near native houses and villages, and in such situations often give a finishing charm to the landscape." (Tropical Nature, p. 257).

Marianne North, the famous flower painter, speaks of the magnificent luxuriance of the Bamboos in India and of an Ipomaea, white in color with deep purple tube "often weighing down a giant Bamboo." This is a valuable hint how we may utilize rampant and beautiful climbers in our gardens. In fact, I have seen in Florida the glowing Flame Creeper, (Bignonia venusta), the rosy-red Love Chain (Antigonon leptopus) and the yellow Carolina Jessamine climbing over tall Bamboos, and the sight was one I shall never forget.

Kingsley relates in his charming book "At Last," his impressions of Trinidad and frequently mentions the grace and beauty of the Bamboo in combination with other plants. And it is true, one Bamboo alone, without any other plant around it, does not form a satisfactory picture. It must grow together with other plants to show by comparison and in contrast its feathery beauty and elegance. It must be seen in groups backed by tall palms and other evergreen trees. It must be viewed along the water. You will then have a charming landscape picture, as beautiful and impressive as it is unique and strictly tropical. "From the landscape gardener's point of view," says Lord Redesdale, "it seems almost unnecessary to say that a good background is of the first importance to show off the beauty of the Bamboo. . . . . The tall culms waving their dainty green foliage against such a backing, under the influence of the gentle summer breeze, are the embodiment of all that is graceful, while the tender leaves look like a flight of the most delicate green butterflies hovering in the air. A group planted on a lawn may be effective, but Bamboos are seen at their best when their graceful bending culms are shown in contrast against stiff and darker foliage. If such a position

can be found on the banks of running water, with here and there a rugged moss-grown rock, cropping out of the hill-side, there you have the ideal composition dear to the Japanese landscape painter." And in another place the same author says, "Background is the great secret of getting the best effect of plants in which beauty of form is the dominant feature."

In Orlando the Bamboos are a sight in many gardens. They add largely to the beauty of the city, more than all the other plants combined. There is a large hedge of Bambusa argentea along the street of Bishopstead, and on the same place, which was laid out and planted by a real lover of the beautiful, there are large clumps of different Bamboos forming the background of the lawn. The Summerlin House, a very cozy hotel, is hidden behind large clumps of the Giant Bamboo and other species. The beauty and privacy of this place is due to the masses of these elegant plants. In many other places of the state Bamboos form a conspicuous feature in the gardens. In some of the parks of Jacksonville they are used largely in combination with Magnolia grandiflora, the holly, different coniferous trees and cabbage palmettos. In Daytona, St. Augustine, Palm Beach and Miami they are everywhere a characteristic feature in the large gardens and parks.

Like the palms, the Bamboos are children of the tropics, and like the palms, quite a number of species overstep their boundary line both north and south. Thus two species are common in our southern states, occurring as far north as Illinois, Indiana and Virginia, where they form on rich wet soil the so-called canebrakes. In Japan and China they form a most conspicuous part of the forest flora to the exclusion of almost all other underwood. Dr. C. S. Sargent, the celebrated director of the Arnold Arboretum and author of "Sylva of North America" who traveled largely in Japan, writes as follows: "In Japan the forest floor is covered, even high on the mountains and in the extreme north, with a continuous almost impenetrable mass of dwarf Bamboos of several species, which makes traveling in the woods, except on beaten paths and up the bed of streams, practically impossible. These Bamboos, which vary in height from three to six feet in different parts of the country, make the forest floor monotonous and uninteresting, and prevent the growth of nearly all the under-shrubs except the most vigorous species. Shrubs therefore are mostly driven to the borders of roads and other open places, or to the banks of streams and lakes, where they can obtain sufficient light to enable them to rise above the Bamboos, and it is the abundance of Bamboos, no doubt, which has developed the climbing habit of many Japanese plants, which are obliged to ascend the trees in search of sun and light, for the Japanese forest is filled with climbing shrubs, which flourish with tropical luxuriance." Truly a startling statement!

Dr. E. H. Wilson, the botanical collector, speaks about the Bamboo thickets in Szechuan, China, growing above 7000 to 10,000 feet, forming "one absolutely impenetrable thicket. Nothing is more disheartening to the botanical collector than

the Bamboo jungles. Practically nothing can grow in them but Bamboos. There is no traversing them, save by the recognized paths, unless there is time to cut a new track, and if there is the slightest rain falling at the time one is drenched through by the overhanging culms."

These Chinese and Japanese Bamboos all belong to the genus Arundinaria and Phyllostachys which are mostly strong runners covering quite a space in a very short time—species not to be recommended for ornamental planting in Florida.

In the Himalayas we find other scenes; tufted Bamboos in great luxuriance covering the ground among rhododendrons, talaumas, magnolias, michelias and other evergreen trees. They grow in clumps of extreme loveliness. Here mention must be made of Thamnocalamus Falconeri, Th. spathiflorus, Arundinaria falcata and perhaps of A. nobilis. Here also the grand Dendrocalamus Sikkimensis and many others are at home. There are running species also, to be sure, but they are not prominent and not such dangerous invaders as the Japanese and Chinese species.

I have already alluded to the canebreaks of our southern states. These canebreaks are always found on rich low land and covered, in colonial times, vast stretches of the country. There are two species, the large cane, Arundinaria macrosperma, and the switch cane, Arundinaria tecta. The tall species inhabits the alluvial bottoms more or less submerged for the greater part of the year, and the small or switch cane prevails in the open as well as in the forest on low plains which rise above the water courses and are subject to overflow only at times of high freshets.

Dr. Carl Mohr in his most valuable book "Plant Life of Alabama" says: "So conspicuous was this formation in the western part of the plain that it is called emphatically the 'canebreak region.' At present a comparatively small representation of the smaller cane remains. It occupied the most fertile lands, and these were claimed for the plow by the earliest settlers. Although the growth was so dense as to be almost impenetrable, it was easily eradicated, being susceptible to the effect of fire. The strips of the large cane which lines the banks of the larger streams subject to frequent overflow have for the most part remained intact."

These southern canebreaks are very interesting to the naturalist as they not only contain a very striking assemblage of different plants but also a number of most interesting and beautiful birds. The fine Swainson's warbler appears to be restricted to the canebreaks and many other birds, like the Maryland yellow-throat feel at home in them. In winter large numbers of migratory birds find food and shelter in these thickets.

The most beautiful Bamboos, all tufted, and of imposing growth are found in India, Ceylon, Burma and Java. Here the giants of the family occur, forming immense clumps 100 and even 120 feet high. Bambusa vulgaris, the Katang or B. arundinacea, B. tulda, B. Brandisii, B. balcooa, Gigantochloa aspera, G. maxima, G. atter, Dendrocalamus strictus, D. Hamiltonii, Schizostachyum Blumei and many others belong here.

Africa and Australia have few Bamboos. Baron Ferdinand von Mueller, the celebrated Australian botanist, reports about four species as occurring in the northern part of Australia. Oxytenanthera abyssinica, a beautiful tufted Bamboo from eastern central Africa has been lately introduced into this country by the United States Department of Agriculture.

Nastus Borbonicus is found in the island of Bourbon or Reunion, where it forms a belt all around the mountain of the island in a zone 3000 to 4000 feet. This beautiful species grows to a height of about 50 feet.

The West Indies have their own indigenous species. Trinidad alone is reported to have five distinct Bamboos. Dr. Davy describes the crater of Grenada as a large lake surrounded by dense masses of Bamboos and tree ferns, and Kingsley speaks with enthusiasm about their graceful wands overhanging the mountain streams of Trinidad In Guiana they occur, but only the introduced Indian species form a feature in the landscape. Some species are found as far south as Argentine and Chili. Chusquea andina and Ch. quila of Chili grow almost in the same spreading way as the Japanese and Chinese species. The American headquarters of the Bamboo, however, are found in Brazil where many beautiful species of the genus Guadua, Arthrostylidium, Merostachys and Chusquea occur. Unfortunately I have not been successful in obtaining a single specimen for my collection though they are described as most beautiful and elegant plants, the stems of some being red and purple.

Mr. Alfred Wills writes as follows in "The Gardeners' Chronicle," Vol. 15, 1881, p. 701): "Three years ago I was in Brazil and I am tempted to send you an extract from some notes made on that occasion, and of a ride from Petropolis to Theresopolis, and some of another excursion in the neighborhood of Petropolis. . . . The path cannot be much used, for it was half overgrown with Bamboos and we had to cut our way at times through the thick overhanging stems. Bamboos of one species or another were the predominant feature in the picture, and the Bamboo, whether large or small, is like the coco-nut tree, always beautiful, and never palls upon the sight. No one can ever gaze upon a great primeval forest where among the lower trees every bough is hung with Bamboos, and every rough outline is broken down and rounded into grace and beauty, so that the eye wanders over a cataract of graceful foliage, out of the heights and depressions in which rise the lofty stems of the great fathers of the forest, without owning that until he has seen the vast thickets of Bamboo in which the Brazilian scenery rejoices, his experiences of the beauty of Nature are incomplete. . . . In one part of the road itself and the forest glades above and below are thickly studded with long rods of Bamboo, decked with a ruffle of foliage at every joint and hanging out in curves in which the line of beauty seems to be typified. In many cases the fine end of the rod had, when young, been swayed by the wind until it had caught in a neighboring thicket and was held prisoner. The Bamboo growing to

its full size, and the end being still held down, has grown into something very nearly approaching a complete circle, large enough for us to ride through without lowering our heads, and the frequency with which this happened gave a quaint and novel aspect to this part of our ride. . . . The great beauty here consists, not in the distant scenery, but in the masses of tangled foliage of every description

"The trailing Bamboo grows as the Thunbergia does in the Peradeniya gardens at Kandy in Ceylon, and transforms tree stems into columns, and thickets into masses of leafy architecture, giving you walled roofs, colonnades, arches, buttresses and architectural fancies of every kind. Then there are great masses of Bambusa gigantea, (perhaps Chusquea Gaudichaudi or some other tall growing native species. H. N.) not attaining at this height above the sea and in this latitude anything like its true stoutness and size, but still running up to 30 or 40 feet, throwing out its large leaves and hanging gracefully over the path. The following few lines were written of a ride in a different direction, but still in the neighborhood of Petropolis: 'Perhaps the feature of the scenery was the presence everywhere of giant Bamboos trailing and hanging over everything, just as the small creeper does elsewhere. It must be seen to be believed how wonderful, how fantastic, and how full of grace and beauty it all was. In one place a narrow gorge was filled up with this kind of beauty, the Bamboo hanging on every stem and branch, and transforming them into houses and church spires and steeples and Gothic arches and I know not what; and then countless specimens stood singly, drooping gracefully as they rose and looking like gigantic fishing rods hanging out the ravine, save only that every joint of the fishing rod was decked by a beautiful fringe or collar of bright green leaves.'"

I have quoted these valuable notes in full because they show us a different type, the climbing Bamboo. Such Bamboos would indeed form a grand feature in our Florida parks and gardens, particularly among trees which they will adorn with masses of foliage. It is to be regretted that Mr. Willis does not mention the names of these climbing species, but I suppose he has the following in mind: Merostachys capitata Hooker, Chusquea capituliflora Trin., or some other closely allied species. In our time of scientific progress and rapid transportation it should not be difficult to introduce all the species of Bamboos from the region of Rio de Janeiro.

"We may be sure, nay we know" to quote again from Lord Redesdale, "that there is many a Sleeping Beauty only waiting till some lover shall carry her off from her mountain fortress to awake under the faint but kindly rays of an English sun." How many more of these Sleeping Beauties from tropical lands could be brought to this state to awake where the sun is powerful, the light brilliant, the climate humid, the soil congenial! May we hope that the Bureau of Plant Industry with its staff of able and earnest scientific workers will help us

to increase the number of tropical Bamboos in our gardens.

FLOWERING OF BAMBOOS

I have never as yet seen a Bamboo in flower, and of the many species growing in Florida, none to my knowledge ever has flowered. A generation may come and go and no flowering takes place It takes from 20 to 50 years till most species show their inflorescence. Then they seed and die. Seedlings, however, appear around the old plants and replace them. This phenomenon is now and then oberved in our native species, and as it is exceedingly interesting I offer the following quotation from Dr. Carl Mohr's "Plant Life of Alabama." "These two species (Arundinaria macrosperma and A. tecta), which resemble each other so closely in habits, differ greatly in their modes of reproduction, a subject of much interest of which but little is as yet known, and one which invites the attention of the investigator of the ecological relations of plants and no less that of the agriculturist, on account of the value of the canes as pasture plants. The switch cane (Arundinaria tecta) rarely exceeds the height of 12 to 15 feet, and the slender culm, branched from the base, is seldom half an inch in thickness. Early in spring, apparently every three years, the paniculate flowers are produced on naked shoots scarcely exceeding 18 inches in height, while the tall flowerless canes are sent up every season from the long creeping rhizomes. The large cane (Arundinaria macrosperma) from 15 to 30 feet high and frequently an inch in diameter, produces the panicles of its flowers in the axils of the branches at long and indefinite intervals of time. It is evident, therefore, that generations may pass by before the spectacle of such a canebrake in bloom is ever witnessed. For example, in the beginning of the summer of 1896 the inhabitants of Russel County, Alabama, were astonished suddenly to find the large canebrakes bending under the burden of their heavy nutritious grains, which attracted large numbers of birds and beasts. The farmers regarded this as an entirely new plant and finding their stock grew fat upon the seed stored away quantities of it, not only for future feeding, but under the delusion that if sown it would constitute a crop of small grain equal in value to any previously grown. But in the light of experience it is to be presumed that a period of not less than 40 or 50 years has to pass before the propagation of this plant by sexual reproduction takes place. With the maturity of the seed the vitality of the plant is exhausted and the cane decays. In the succeeding season, from the spontaneous stocking of the ground with an abundance of seed, a new crop springs up. The seedlings produce no branches during the first year. These simple sprouts, which are known as 'mutton cane' are tender and sweet and afford the best of pasturage. They are particularly sought after by bears, which find in the impenetrable density of the canebrake their securest retreats."

The flowering of most other Bamboos is very similar. In some parts of India jungles of the Katang (Bambusa arundinacea) are found. After a growth of

some fifty years duration it flowers and seeds. The masses of culms die and then fire sweeps over them and every vestige is burnt. Where it formerly covered many square miles with its large picturesque clumps only a few charred pieces of the rootstalks show where the Bamboo forest once stood. In the rainy season many of the seeds sprout and in a few years a new jungle as beautiful and picturesque as the former, occupies the place of the old one. (See "Garden and Forest," 1891, pp. 386, 387. An excellent and exhaustive account.) The most noteworthy phenomenon is that all the plants of one species whether old or young, large or small, flower at the same time over vast regions and having seeded, for a time the plant disappears. Auguste St. Hillaire, the naturalist who explored Brazil, mentions a forest of the Toboca (very likely a species of Guadua) where he was "entranced by the aerial beauty of the long canes 40 to 50 feet high bending in elegant arches, crossing one another in every direction, tangling their huge panicles and giving glimpses of the deep blue sky through a spreading of diaphanous web of foliage. "The plant was then in flower. When I passed that way a few months later the forest had disappeared."

Not all the species die after flowering. I have pointed out in the above that our native Arundinaria macrosperma dies after fruiting but that the closely allied switch cane (A. tecta) is not at all affected by its seeding, which occurs every three years. As a rule all the species flowering at great intervals die after seeding, while those that flower either every year or at short intervals continue their growth as if nothing had happened. Arundinaria Simoni and A. japonica (metake) have been known to flower in Europe without dying. The male Bamboo of India (Dendrocalamus strictus) also flowers at intervals of a few years. The old culms die down but young ones shoot up. In his classical book "The Bamboo Garden" A. B. Freeman-Mitford (Lord Redesdale) gives a very interesting and exhaustive account on this important and noteworthy subject.

USES OF BAMBOOS

Volumes could be written about the uses of the Babmoos and still much would be left unsaid. It is usually considered by all naturalists that the Bamboo is the most useful plant in existence. In the life of the Japanese and Javanese, the Chinese and Burmese, the Siamese and Annamese, the Malay and the Papuan, the Bamboo is indispensible. The young shoots of many Bamboos are highly relished, used in the same way as we use asparagus—and the seeds are made into a fermented drink, or into bread.

Dr. S. Kurz has written a book on the uses of the Bamboos in Burma, and Alfred Russell Wallace writes pages on this subject in his book "Tropical Nature" and "The Malayan Archipelago." I shall here only quote from the "Bamboo Garden" how these plants are used in China and Japan. Lord Redesdale writes:

"To the Chinaman as to the Japanese, the Bamboo is of supreme value, indeed, it may be said that there is not a necessity, a luxury or a pleasure of his daily life to

which it does not minister. It furnishes the frame work of his house and thatches the roof over his head, while it supplies paper for his windows, awnings for his sheds and blinds for his veranda. His beds, his tables, his chairs, his cupboard, his thousand and one small articles of furniture are made of it. Shavings and shreds of Bamboo are used to stuff his pillows and mattresses. The retail dealer's measure, the carpenter's rule, the farmer's water wheel and irrigating pipes, cages for birds, crickets and others pets, vessels of all kinds, from the richly lacquered flower stands of the well-to-do gentlemen down to the humbler utensils, the wretchedest duds of the very poor, all come from the same source. The boatman's raft and the pole with which he punts it along; his ropes, his boat-sails, and the ribs to which they are fastened; the palanquin in which the stately mandarin is borne to his office, the bride to her wedding, the coffin to the grave; the cruel instruments of the executioner, the lazy painted beauty's fan and parasol, the soldier's spear, quiver and arrows, the scribe's pen, the student's book, the artist's brush and the favorite study for his sketch; the musician's flute, mouth-organ, plectrum, and a dozen various instruments of strange shapes and still stranger sounds —in the making of all of these the Bamboo is the first necessity. Plaiting and wickerwork of all kinds, from the coarsest baskets and matting down to the delicate filigree with which porcelain cups are encased so cunningly that it would seem as if no fingers less deft than those of fairies could have woven the dainty web—are a common and obvious use of the fiber. The same material made into hats like inverted baskets protects the coolie from the sun, while the laborers in the rice field go about looking like animated hay cocks in waterproof coats made of the dried leaves of the Bamboo sewn together. See at the corner of the street a fortune teller attracting a crowd around him as he tells the future by the aid of slips of Bamboo graven with mysterious characters and shaken up in a Bamboo cup, and every man around him smoking a Bamboo pipe. See in yonder cook shops the son of Han regaling himself with a mess of Bamboo shoots, which have been cooked in a vessel of the same material coated with clay, and are eaten with chopsticks which may have grown on the same parent stem. Such shoots, either in the shape of pickles or preserved in sugar, are an article of export from south to north where they are esteemed a delicacy.

"Then there is the famous medicine Tabashir, the great and infallible nostrum with which some Buddhist priest or Chinese Dulcamara will promise to heal you of every and any ailment. In certain Bamboos, esepcially according to Roxburgh, in the *Melocanna bambusoides,* there is found in the cavities between the knots a substance consisting of silica with a little lime and vegetable matter, or sometimes silica and potash in the proportion of about 70 parts of silica to 30 of potash. It is said to be formed by extravasation of the juices of the plant in consequence of some diseased condition of the nodes or joints. Beautifully opalescent, the loveliness of Tabashir is by the

faithful regarded as only equalled by its medicinal virtues. Some idea of the quantity of silica contained in bamboo may be gathered from the fact recorded that one species, Bambusa Tabacaria, will emit sparks when struck with an axe." (This is a fact and is true also of other species. Not long ago I tried to cut a dry stem of Bambusa argentea near the nodes with a sharp knife and not only sparks were emitted, but my hand, which held the knife felt a shock as if powder had exploded, and there was a strong and peculiar, somewhat sulphurous odor. Dry Bamboo stems placed in the fire give off sharp reports as if a gun was fired or if bunches of firecrackers were exploding.)

Lord Redesdale continues: "House, furniture, art, clothes, arms, food and medicine, what does this wonderful plant not supply? And it is all so cheap, too; for the materials of the common dwelling house in the south of China cost about twenty-five dollars.

"Now the Malay villages, where the homes are carried upon poles above the red teeming swamp, like the old lacustrine dwellings, there is sure to be a Bamboo grove. Towards evening, when the fresh sea-borne breeze drives the burning stillness of the day before it, bringing to the poor washed out natives a faint renewal of energy, weird and ghostly strains come floating upon the air. It is no mortal music, for Aeolus himself is the musician, rivalling the great god of Pan of old. In one of the hollow stems of the grove holes have been pierced, some greater and some less, one in each joint, through these the Wind-God breathes fitful wailing sounds, now deep like the pedal notes of an organ, now soft as a fairy's flute. This is Bulu Perindu, the plaintive Bamboo, the analogue of the Aeolian harp." (See Sir Emerson Tennants "Ceylon," Vol. 1).

The uses of the two native Bamboos among the Indians have been as varied as they were important. Even today the Large Cane (Arundinaria macrosperma) furnishes the principal material for the basket making of the remnants of the Cherokees, Choctaws, Creeks, Chickasaws and Seminoles. The Choctaws especially excel in its use and their little baskets, variously colored, are offered for sale in several northern cities.

Belt says that the houses of the Indians in Nicaragua are usually built of Bamboos, but as a matter of fact, the uncivilized people of the tropics are far behind the Japanese, Chinese, etc., in the use of this most valuable material.

Mr. David G. Fairchild, Agricultural Explorer of the U. S. Department of Agriculture, who has traveled largely in Japan and China and who studied the Bamboo and its uses thoroughly, has laid down his investigations in a special bulletin, "Japanese Bamboos and their Introduction into America" (Bureau of Plant Industry, Bull. No. 43), a most valuable contribution on the Bamboo, in which he suggests how these plants may be used in this country in many ways where wood is now used. As our forests are fast vanishing from the face of the earth it is very timely and most important that some plants should be found which may be used in place of wood. Most of the valuable

species of Japan are described in this pamphlet, and the timber Bamboos are particularly considered. Mr. Fairchild is an enthusiast, and an energetic worker, and under his instructions Mr. F. N. Meyer, one of the most successful botanical collectors of our time, has lately brought together about thirty different kinds of Bamboos, mostly in the vicinity of Tangsi, Chekiang, China. It is the intention of Mr. Fairchild to establish Bamboo plantations in California as well as in Florida and elsewhere in the south where the climatic conditions are favorable. Particularly in Florida vast tracts of rather low land could very likely be planted with Bamboos for commercial purposes. Even if the stems would not come in use very rapidly for different manufactures, the plant would be extremely valuable in the manufacture of paper, an excellent kind of paper to be sure. The smaller growing species in connection with our native kind would also make fine pasture plants.

That this step of the Bureau of Plant Industry is one in the right direction and that it will prove a successful one is doubtless. Florida abounds in Bamboos already, particularly in tropical kinds, but there is still a vast field to work over. We know that there are many species in India, Burma, Indo-China, Formosa, Java and particularly also in South America and the West Indies, which await to be carried to this state of sunshine and flowers. One man can do little, but an institution like the Bureau of Plant Industry with a staff of excellent scientific workers at its command, can easily introduce all available forms from the tropics in a very short time.

In the spring of 1897 I imported the following Bamboos direct from Japan: Ha-chiku (Phyllostachys Henonis), Hotaichiku (Phyll. aurea), Kanzan-chiku (Arundinaria Hindsii), Kiko-chiku (Phyllostachys heterocycla), Kuro-chiku (Phyll. nigra), Kimmei-chiku (Phyll. Castillonis), Metake (Arundinaria Japonica), Moso-chiku (Phyll. mitis), Suochiku (Bambusa Alphonse Karri), Taihochiku (B. argentea striata), Horai-chiku (B. disticha), Shibo-chiku (Phyll. Marliacea). Yadake (Phyll. bambusoides), Tamin-chiku (Phyll. Hindsii var. graminea), Hakone-dake or Hakonechiku (B. Laydekeri), Suzu-dake (B. senanensis), Taisan-chiku (?), a most beautiful distinct giant Bamboo, Narihiradake (Arundinaria Simoni), Shihakudake (B. quadrangularis) and a number of others with Japanese names which I cannot find in print. All were planted out in November, 1897, around my lake in black, moist soil and all grew into most beautiful specimens within a few years. In the summer of 1904 and 1905 the water of the lake rose rapidly until all the plants stood one and two feet deep in the water. As the lake did not fall within the next three years all the Bamboos on the lowland perished. Only a few were saved.

There are Japanese and Chinese Bamboos in other gardens particularly in the late Mr. E. H. Hart's, in Mr. Theo L. Mead's, in Reasoner Bros. Nursery at Oneco, and everywhere they have proved exceedingly rampant growers. The ex-

tremely beautiful, tufted kinds are always preferred as ornamental plants by our Florida people, particularly the tall and picturesque tropical species.

As a rule the Japanese and Chinese Bamboos do not thrive well on high land, and if the land is very low it must be drained. They demand a very rich, moderately moist soil. I have received a very fine collection of Bamboos lately from Mr. Gauntlett, Chiddingfold, England, who makes the hardy Bamboos his specialty. The plants are very beautiful and true to name.

In setting out these imported Bamboos it is necessary to shake off all the soil from the roots before planting. This applies to all other plants. They have usually a ball of clay soil around their roots. This clay soil or "loam" must always be removed. If the ball is set out it becomes in our soil, even when raining every day, as hard as a brick and as the roots cannot leave the ball the whole plant soon dies. Hundreds and thousands of plants, received from northern and foreign firms, have annually perished in Florida, for the simple reason that the old soil was not removed. And then the climate, the soil, or the rains and droughts are blamed for it.

If you want your Bamboos to succeed place them in rich soil, water and fertilize frequently and you will be astonished about the tremendous growth they make. Mulching with old leaves, weeds and pine needles is also very beneficial. A mulch of stable manure applied during the rainy season helps them along wonderfully. This should only be done with large plants, small specimens should not be mulched with manure until well established.

From the foregoing will be seen that the habit of growth of the various species is very different. Some are small and some are tall, many are exceedingly dense, others are more open and some are even climbers. According to growth we may classify them as follows:

(a) Bamboos growing in dense tufts or clumps. They do not spread over places where we do not want them. All the species of this group are exceedingly ornamental and picturesque. Bambusa vulgaris, B. argentea, B. arumdinacea, Dendrocalamus strictus, Bambusa Alphonse Karri, etc., belong here. They may be divided in hardy and tropical species.

(b) Bamboos with running root stocks. The new shoots may appear close to the plant, or they may wander ten feet wide and appear there above the soil. They soon form veritable jungles of stems. Where room is no object they should be planted 50 to 60 feet apart and kept in check, not allowing their spreading out over the defined limits. Great care must be taken to assign to those sorts which are rampant at the roots (such as Arundinaria metake, A. Simoni, and several others) isolated positions where they may run riot as they please. Failing this precaution, there will be in a very short time endless work and trouble in checking their invasions. Above all let the group be as big as may be suitable, but do not mix the species. Let each variety stand out by itself. As Mr. Bean says "If this is not attended to, and the spreading rhizomes

kept within certain bounds, the different kinds run into each other and the whole eventually becomes a hopeless jungle."

Among this group there are a number of exquisite ornamental kinds like Phyllostachys nigra with black stems, Ph. mitis with golden yellow stems, Ph. viridi-glaucescens, P. Henonis, Ph, Castillonis, the latter with variegated stems and foliage, Bambusa fastuosa and others.

Almost all of this group are natives of China and Japan.

(c) Bamboos with scandent or climbing stems. Unfortunately they are as yet not represented in our gardens, though being extremely beautiful, climbing high up in the trees and festooning the branches with elegant masses of dense foliage. In Jamaica Chusquea abietifolia is a tall climbing Bamboo, and the Brazilian forests appear to abound in them. Dinochloa Andamanica of the Andaman Islands climbs 100 feet high, and D. Tjankorrah of Java and the Philippines is also a beautiful climber, though not so tall. Schizostachyum parviflorum festoons small trees and shrubs in Madagascar with dense masses of plume-like foliage.

(d) Bamboos with berry-like fruit. In this category we must place the beautiful Melocannas of India. Melocanna bambusoides of Chittagong bears fruits as large as small apples, of a red color and with seeds as large as an almond's. Undoubtedly this species would do well in Florida. Mr. David G. Fairchild, our Agricultural Explorer, succeeded in importing fresh seed but unfortunately they did not germinate.

None of the running kinds, such as Phyllostachys and Arundinarias can compare in beauty with the tufted species. They are far inferior to all of them, and on account of their spreading propensities they soon become a nuisance in the gardens. For this reason I do not recommend them for ornamental plantations and gardens. And we have so many more beautiful tufted species that we can get along very well without them. Do not be misled by Freeman-Milford's glowing descriptions in his classical book, "The Bamboo Garden." In England the climate does not permit to grow the much more beautiful tufted species. There only the hardy Japanese and Chinese Bamboos can be grown advantageously. Many of these species in our climate in rich soil grow so tremendously that they become pernicious weeds, worse than maiden cane, and much more difficult to eradicate. I can recommend conscientiously the following tufted species which I grow in my garden:

1. Bambusa argentea, or more correctly B. vittata. A very beautiful dense growing species. The Japanese have grown this since time immemorial in pots. Where it comes from nobody seems to know, but its home is perhaps somewhere in India. It is very common all over the state. Its variety, B. vittata argentea has foliage striped with white. This is the Taiho-chiku of the Japanese, which very likely originated in their gardens centuries ago, being undoubtedly a sport of the former. The late Mr. E. H. Hart, one of Florida's ideal old horticulturists, imported it direct from Japan many years ago. It is now common all over the state,

being one of the gems of our garden.

2. Bambusa Alphonse Karri, the most beautiful of all our Bamboos. The foliage is very dense and of a deep green color, and the golden-yellowish stems are striped with green and pink, a very distinct and characteristic feature, adding greatly to its beauty. Clumps 35 to 45 feet are not uncommon in the state but it is not as generally planted as its beauty entitles it to. In Japan it is grown largely in pots under the name of Suo-chiku. Mr. Theo. L. Mead, of Lake Charm, introduced it directly from Japan about 35 years ago.

3. Bambusa disticha. Formerly disseminated by Reasoner Bros. under the name of Arundinaria falcata (a Himalayan species, which does not thrive in our state) was also introduced by Mr. T. L. Mead, from Japan. The foliage is very dense and small, and the clumps form perfect masses of dark green color about 8 to 12 feet high. Very distinct.

4. B. verticillata. A stronger growing bamboo than the first named kind with larger foliage. Very impressive when seen in large tufts.

5. Bambusa spec. The "Fishing-pole Bamboo" introduced by Mr. T. L. Mead from Trinidad many years ago. Grows about 50 feet high in rich moist soil. The clumps form globular masses of dense green. They are similar to the former, but the growth is larger and more massive.

6. Bambusa scriptoria. This beautiful little Bamboo grows only about 6 to 8 feet high in dense tufts. It was imported by me from England a few years ago. It is not yet in the trade. Foliage very small and dense. Looks like a miniature of B. vittata, but it has a beauty entirely its own.

7. Bambusa Thouarsii. A most beautiful tall growing Bamboo, originally from Madagascar, but recently introduced by the Bureau of Plant Industry from the Riviera. If this is a variety of B. vulgaris, as the botanists say, our plant so long known under this name must be something different. B. Thouarsii is a tall upright grower, very beautiful and densely branched. My plants were not injured during the last three winters. For this reason I rank it with the hardy species.

8. Bambusa species. The finest tufted bamboo in my collection, far outrivalling in beauty and growth the common B. vulgaris, and it has the advantage of being perfectly hardy. My plants were imported direct from Japan in 1895 under the name of Taisan-chiku. The culms which have a curcumference of 12 inches, grow 50 to 65 feet high. They are glossy black in their second and third year, then becoming gray. The leaves are large, 10 to 12 inches long and of a very beautiful emerald green. Not yet in the trade.

There are three tufted deciduous hardy bamboos, praised in English, French and German catalogues in glowing terms: Thamnocalamus Falconeri, Arundinaria falcata and A. nobilis. All three come from high altitudes in the Himalayas. They are very beautiful in summer when in full foliage but in winter they look not attractive at all. I have imported plants of all these species repeatedly but

all were a failure. They grow vigorously during the spring, but as soon as the rainy season sets in they always died.

Among the tropical Bamboos we are fortunate enough to have seven different species in our gardens. The most common is undoubtedly the so-called:

1. Bambusa vulgaris, a large spreading species, exquisitely beautiful when in full vigor and health but the most tender of all I have in my collection. Clumps 75 feet high and as much in diameter at their tops are not rare. Its variety with golden yellow culms is much more beautiful. A slight frost kills it down to the ground, but it sprouts vigorously in spring when heavily fertilized with stable manure.

2. Bambusa arundinacea (advertised by Reasoner Bros. as B. spinosa). This is a very beautiful dense growing spiny Bamboo, growing 50 to 75 feet high.

3. Bambusa sp. Sold by Reasoner Bros. under the name of Dendrocalamus strictus, which is, however, a very different plant. It is a very dense growing species bending over to all sides. Its height is about 30 to 35 feet. The color of the rather small dense foliage is a very delightful green with a slight bluish cast. No other Bamboo has such a charming color in its leaves. In order that it may show its unique beauty it is necessary to give it room to spread. Isolated specimens in the foreground of large magnolias and palms look exquisitely beautiful. The outer culms bend almost or entirely to the ground and the specimen appears like a dense semi-globular mass.

4. Bambusa Tulda. A very large and fine Bamboo, introduced by the Bureau of Plant Industry from India. My two specimens are, though young, very attractive and they have proven to be the most hardy among the strictly tropical Bamboos.

5. Dendrocalamus strictus, the true species with large dark green leaves and gigantic upright culms. Introduced by the Bureau of Plant Industry. When heavily fertilized this species makes a gigantic growth.

6. Oxytenanthera Abyssinica. Introduced by the Bureau of Plant Industry from Eritraea, Abyssinia. Stems large and very slender, bending to all sides. Leaves large and dense. A very distinct ornamental species.

7. Cephalostachyum pergracile. Another importation of the Bureau of Plant Industry from the teak forests of Burma. This is the least beautiful of all the tropical Bamboos in winter as it sheds its leaves almost entirely. It grows well in half shaded damp soil.

All these tropical species are easily hurt by frosts and they therefore should be only planted extensively in the lower peninsula where frosts are slight and rare.

NATIVE AND EXOTIC

By Charles T. Simpson

Mr. President, Ladies and Gentlemen:

For 40 years it has been a life dream with me to be able some day to live in a land where there is no winter, and where I might cultivate the beautiful and strange vegetation of the tropics. A little over nine years ago I resigned my position in the Smithsonian Institution and came to Dade County, Florida, to make a home for an old man.

The piece of land selected for this purpose fronted on Biscayne Bay, in the village of Lemon City about five miles north of Miami. It contained some 15 1-2 acres; three acres of the front being low hammock or muck land, two acres joining this, rocky, high hammock, and the rest rocky pine land. I was 56 years old and having little spare money I put on overalls and a blue shirt and began the task of making a home in the unsubdued wilderness. I chose this region for my home after studying Cuba, Haiti, Jamaica and the Bahamas. These islands have the advantage of a more tropical climate than South Florida, their soil is generally richer, but I felt that to them could be applied the lines from the missionary hymn,

"Where every prospect pleases,
And only man is vile."

This region has its decided disadvantages to the grower of fruit and ornamentals. It lies in the track of the West Indian hurricanes and its soil is generally poor, but I felt that by proper fertilization it might be made to produce a finer quality of fruit than that which grows in the rich soil of the West Indies. I have sometimes felt that the remark made to me by a Bahaman truck grower at Homestead that "there is a hinsect here for every wegetable" was true. And there are sometimes mornings here in winter when the mercury wakes up to find itself "below the frost line" on the face of the thermometer.

The clearing of the land here is an excessively heavy and expensive task, dynamiting, burning and removing trees, grubbing rock, getting it off the ground, and destroying the three or sometimes four species of palmettos as well as a variety of other scrub. And when it is all done the grower has a waste of dry, sandy soil in which it is exceedingly hard to make tender plants grow. I believe it to be an excellent idea when clearing land to leave small pine trees and some of the low palmettos standing to shade and shelter the ground and protect young and delicate plants. The pines and palmettos may be removed later if necessary.

One of the difficulties the grower has to encounter is the frosts and occasional spells of chilly weather. I have never been able to devise any means by which I could completely protect young and tender plants from frost.

It is a good plan to make a mound of dry earth around such young plants, say early in December, to be removed as soon as danger of frost is over. This protects the collars of plants and if the tops be frozen they will generally sprout up vigorously. As soon as most tropical trees and shrubs have attained a height of six or eight feet they are not likely to be seriously damaged here.

It would be impossible within the limits of a paper like this to give anything like a complete list even of the ornamental trees, shrubs and plants growing wild and already cultivated here. I shall therefore only attempt to mention the more prominent forms calling attention to those that seem to be especially adapted to our peculiar soil and conditions, and to others which do not seem to succeed. The paper will therefore be only a sort of "first aid " to the cultivator.

NATIVE ORNAMENTALS

This region is especially rich in vegetable forms. In the pine woods the greater number of the species belong to a warm temperate flora, this being almost its extreme southern extension. A very large tropical element of the flora has evidenly migrated from the West Indies, the Spanish Main and Central America, the seeds having probably been carried on the Gulf Stream and deposited on our shores during hurricanes or high southeasterly winds. The seeds of a few forms may have been carried by birds or the winds. The region is exceedingly rich in trees, a number of which are quite ornamental. Within five miles of Miami there are probably growing wild to-day nearly or quite a hundred species of trees or large shrubs which sometimes attain tree-like proportions. Most of these species inhabit the hammocks and in many places they become veritable air gardens, being loaded down, even to the breaking point with a great variety of orchids, Tillandsias and other air pines, ferns, Peperomias and cacti.

First among the native ornamentals should be mentioned the palms, "The Princes of the Vegetable Kingdom." South Florida is exceedingly rich in palms. No less than 13 species have been found growing wild in Dade County alone; another arboreal saw palmetto, Serenoa arborescens being reported, so far, only from Monroe County, but without doubt it will be found in Dade County also.

The Cocoanut Palm (Cocos nucifera) has become thoroughly naturalized on the mainland of extreme South Florida and the Lower Keys. Some one has said that it is a "Marvel of Titanic grace," and no finer description of it can be given. It is the tree of the poor as well as of the rich, and every settler, no matter how little improvement he makes, plants a few cocoanuts, that, in a few years, will make his place glorious. The young plants are a little tender and are sometimes killed with frost, but after they have begun to form a trunk they are out of danger. They grow everywhere here from the lowest and saltiest marsh to the highest pine land and the seed from our

trees will, in a majority of cases, germinate and produce other trees.

If the Cocoanut is a "Marvel of Titanic grace" the Royal Palm may be called "A Marvel of Titanic majesty." I know of no tree on the earth to which the term majestic can be more appropriately applied. Unfortunately it has been found that the name Oreodoxa, signifying "Glory of the Mountains" which has always been applied to it, really belongs to another group of South American palms, hence the name was changed to Roystonea. I never look at one of these lordly trees but I am thankful that I live in a land where it not only grows but is native. Mr. O. F. Cook of Washington, who gave the genus its new name, believes that the Floridian form is distinct from the Cuban, and has called it Roystonea floridana, but other authorities differ from him and believe it to be O. regia. Certain it is that I have never seen any of the royal palms in Cuba attain either to the height or dimensions that wild or cultivated specimens reach in Florida. At the Royal Palm Hammock back of Cape Romano, and on Paradise Key in the southeast part of Dade County are many trees which must be well over 100 feet in height. I never see one of these majestic palms but what I feel as though mortals ought to fall on their knees before it and worship with bowed, bared heads. The royal palm is most at home in low, rich hammock but does well in salt marshes, if not too wet and salty. As a rule it does not do well on the high pine land, but it may be improved by liberal mulching, by giving it a coating of muck, and by fertilizing. Quite a number of them growing wild in the swamp just north of me were destroyed since I came here, by wood cutters.

Pseudophoenix sargentii was discovered some years ago on Elliott's Key, and it is quite abundant in places in the Bahamas. It is a stiff, formal, very deep green palm with pinnate leaves and does well under cultivation.

The common cabbage palmetto (Inodes palmetto) is found rather sparingly in Dade County and is always a striking tree, either when young and covered with the old split leaf stalks ("boots") or as an old tree with its tall, rough, often crooked stem and globular head. It will grow well in all soils.

Along the shore of Biscayne Bay is a dwarf species (Inodes megacarpa) which is everywhere mingled with the saw palmetto. In clearing it is well to leave specimens occasionally, as they make fine clumps when given a chance.

Mingled with the last two is a dwarf, fan-leaved palm of exquisite beauty (Coccothrinax garberi) named for a dear botanist who explored and collected in South Florida. The upper sides of the leaves are glossy and a rich green; the under surfaces are the loveliest satiny or silvery color imaginable. It is rather a slow grower and never attains any great height. It is found only on the shores of Biscayne Bay.

On one of the Lower Keys and at Cape Sable is found an allied species (Coccothrinax jucunda) which is much

like the C. garberi only that it is larger in all its parts, reaching a height of 25 feet. Its brilliant purple berries are edible and it is one of the handsomest palms I know, but it grows very slowly when young.

There are certainly four species of Thrinax native to extreme South Florida, all of which are well worthy of cultivation, and are perfectly at home without fertilizer in our poorest soil. One of these the writer has brought to the attention of botanists recently, and though quite common it has been overlooked or taken for something else. It is T. wendlandiana, also found in Cuba.

Acoelorraphe wrightii is a fine native palm which Mr. John Soar and the writer brought to the attention of Prof. C. S. Sargent. It is a handsome fan palm growing in immense tufts 50 feet across and 25 in height and will do well in wet situations. It grows wild in the Madeira Hammocks and in Cuba.

The common saw palmetto needs only a word. If given a chance it will make quite fine specimens. S. arborescens becomes a struggling tree 30 to 40 feet high, the stems sometimes nearly prostrate.

ORNAMENTAL NATIVE TREES

Our common pine is different from the species found in Georgia and North Florida, it being a native of Cuba. It has gone under more aliases than a professional crook or confidence man, having been called Pinus tæda, P. heterophylla, P. cubensis, P. elliottii, P. bahamensis, and it is now believed that Pinus caribæa is the correct name. It is a handsome tree when young, with its great masses of long, rich green needles; it is stately when in its prime and picturesque in its old age. When at its best its somewhat flattened, rounded top reminds one of the picturesque Pinus pinea of Southern Europe which painters love to introduce into their canvases.

Two uncommonly fine specimens of nearly equal size grew in my grounds about 40 feet apart, the one nearly north of the other. I built my house about 35 feet to the westward of these trees and they stand there in their erect, soldierly attitude as guardians. From them I have named my home "The Sentinels" and somehow I imagine that they watch over me night and day. Three other pine trees north of the house were left undisturbed when clearing and these are "The Three Graces." In the darkness of the night they cut the sky line with wonderful effect. Trees and shrubs planted under the pines do very well and I think it a fine idea to leave a few standing in ornamental grounds, and especially about one's house as a protection against lightning.

Our native red cedar was formerly believed to be the same as the northern form but is now referred to Juniperus barbadensis, a West Indian species. It is sometimes planted, but to my mind is too suggestive of a northern climate to be appropriate to this Land of Sunshine.

Yucca aloifolia, or Spanish Bayonet, sometimes reaches the size of a small

tree. It is a striking plant with its stiff, cruelly pointed, dark green, closely set leaves and throughout the summer is covered with immense heads of waxy white lilies. It grows abundantly along the sea shore and will flourish anywhere without care or fertilizer. I am not sure whether its companion Y. gloriosa, is found in Dade County, but it probably is and it is as fine as Y. aloifolia.

A strange tree is Casuarina equisetifolia or Beefwood, which has escaped cultivation in extreme South Florida. It looks a little like a very slender, vigorous white pine, but on close inspection the branchlets look like miniature scouring brushes. It is a most astonishingly rapid grower and like many rapid growing tropical trees it has hard wood. It is being used here considerably for planting along roads, where it does well, but to me it is very dreary looking and suggests snow and ice. It has become naturalized on lower Biscayne Bay over quite a wide area which, in consequence, has been called "The Cedars." It is a native of the Australian region.

The Live Oak (Quercus virginiana) is somehow respected by nearly every one who has cleared up hammock and is often allowed to stand. Whether this is from a love of the beautiful on the part of the settler or from the fact that it is an immense task to clear the trees and get rid of them I cannot say. The tree grows rapidly when young and when old and hung with Spanish Moss is a most striking object. It, however, robs the soil till few things will do well near it.

Our native mulberry (Morus rubra) is one of the very few trees found growing here and in the Northern states, as it ranges to Massachusetts, Michigan and Nebraska. Although it loses its leaves in winter it is covered with its handsome, light green foliage in February, one of the earliest harbingers here of spring.

Ficus aurea, Wild Fig, Wild Rubber Tree or Strangler forms a handsome tree when grown where it has room. The seeds are dropped by birds high up on trees in the hammocks. When they germinate they send down a slender root to the ground, then others which cross and form a network till soon the host becomes strangled and dies. The dead tree quickly decays; the strangler becomes first a complete cylinder then grows inward until it has the trunk of an ordinary tree. With plenty of room it throws down great bundles of air roots which swing in the wind and finally become attached to the trunk, while others reach the ground and the tree eventually may have the character of the Banyan.

Ficus populnea is also quite ornamental.

Shore Grape, a small tree (Coccolobis uvifera) grows abundantly along sandy beaches. It has large, glossy, leathery and nearly round leaves of extraordinary substance and Charles Kingsley called it the most beautiful broad leafed plant he had ever seen. The leaves have red veins and color up to an intense crimson or scarlet as

they die. It bears a rather inferior edible fruit and will grow vigorously planted out in pine land or hammock.

Another species (C. laurifolia) the Pigeon Plum, is a dense headed handsome tree with smooth bark.

The Cat's Claw of the hammocks (Zygia unguis-cati) has curious leaves in pairs, brownish or whitish flowers in heads and twisted pods which, on opening, disclose black or brownish seeds, partly surrounded with a bright red aril, the whole being quite an attractive small tree.

Z. guadalupense is also an interesting species resembling the first.

There is an attractive small tree occasionally found growing wild in the edges of hammocks, the Wild Acacia. It has very delicate, twice pinnate leaves and in the spring small yellow flowers in heads which are deliciously and powerfully fragrant. It will grow without attention in any ordinary pine land. This tree, the Acacia farnesiana, is naturalized throughout the tropics, but is believed by Prof. Sargent to be a native of Texas.

A nearly related tree, the Leucaena glauca, a native of South America, is also naturalized in South Florida. It has very attractive foliage and brown seed pods, the flowers being white. If once introduced into a place it spreads rapidly and becomes a nuisance.

There is a species of lignum-vitæ found growing on the Florida Keys (Guaiacum sanctum) which has small, dark green, glossy, pinnate leaves and attractive blue flowers that is worthy of cultivation, though it is a slow grower.

The Paradise Tree (Simaruba glauca) grows abundantly in hammocks and when cultivated where it has room, is a strikingly handsome tree. It has rather large, long pinnate leaves of leathery texture, extremely glossy and attractive. It contains an excessively bitter principle, and is one of the trees that furnishes the quassia of the druggists.

Closely related to it is the Gumbo limbo, one of the most striking objects in our native forests. It becomes a large and lofty tree with massive, crooked limbs and glossy trifoliate leaves. The entire bark is smooth, peeling off in thin papery layers, and is generally a rich reddish-brown or copper color, though occasionally it is silvery. It is one of the first trees to attract the attention of the visitor to this region. It furnishes the gum elemi of the druggist. Large limbs may be set in the ground where they will root and produce trees.

The well known mahogany grows abundantly on most of the Lower Keys and the extreme southern end of the peninsula, where it occasionally forms a crooked, widely branched tree 40 or 50 feet high and two feet or more in diameter. It is a handsome ornamental when young; its large round seed pods being quite striking. It flourishes in all soils from low, salty marsh to high pine land.

Drypetes lateriflora, the Guiana Plum, is a tree of our hammocks, with shining, long-elliptic, pointed leaves

and when covered with its rich red, velvety fruit, a third of an inch in diameter, is a very attractive object.

Sapindus saponaria, or Soapberry Tree, is found occasionally in our hammocks. It has fine, large pinnate leaves, the petioles being winged, and it bears in spring or summer globular, yellow fruit three-quarters of an inch in diameter. It is quite a pretty small tree and the berries make a good substitute for soap.

One of the handsomest small trees or large shrubs I know of is Hibiscus tiliaceus, which is quite generally distributed along beaches throughout the tropics. It has large, glossy, leathery, cordate leaves and immense yellow flowers with a dark center. It is one of the few native trees which can readily be reproduced from cuttings, as nearly all of them must be grown from seed. It is found sparingly on the coast of Dade County, growing in low land near the sea, and there are two quite distinct varieties of it, one of which has thick, nearly flat, dark green leaves; in the other the leaves are thinner, somewhat plaited and lighter green. They are probably two species.

A closely related tree is Thespesia populnea, occasionally called Headache Tree. It, too, is widely distributed along sea shores in the tropics, and grows wild in Lower Florida. It has smaller leaves and flowers than Hibiscus tiliaceus, the latter slightly tinged with red and turning darker with age.

Almost everywhere in and around hammocks the Wild Pawpaw (Carica papaya) is found growing, and it is a most striking and tropical looking tree. It usually has a stout, unbranched stem 16 to 18 feet high when well grown, and is crowned with immense palmate leaves. The tree is supposed to be dioecious, the male flowers, which are light yellow, being borne on long, pendulous stalks on one tree and the larger, sessile female flowers on another. The fruits, which in cultivation are often as large as a musk melon, are closely clustered among the under leaves and are edible—for those who like them, a good many thinking they taste like squash. The tree is short lived, but is so striking and beautiful that it should be in everyone's grounds.

On the lower Keys a large Cereus (C. monoclonos) occasionally grows, usually in clusters, whose stems sometimes reach a height of 20 feet and a diameter of six inches. It is a most striking object but so far I have never been able to make it do well here.

The Red Stopper (Eugenia confusa) is a beautiful tree in our hammocks with a dense head of very glossy, leathery, long pointed leaves, with small white flowers in the fall, followed by bright scarlet berries. It is well worthy of cultivation.

On the Lower Keys and the extreme southern part of the mainland is found a small, crooked tree with obovate, shining, yellow green leaves and clusters of small, pale yellow flowers in winter that are deliciously fragrant. It is Jacquinia keyensis, and is well worthy of a place in the yard or garden.

The Wild Star Apple (Chrysophyllum monopyrenum) is a handsome, small tree, growing in thick hammocks. Its oval, pointed, thick leaves are glossy and an indescribable blue green above, and covered on the lower side with a brilliant coppery or red-brown pubescence. Although it naturally lives in deep shade it will grow well in sunshine and on high pine land. When the wind tosses up its leaves so that the under surfaces show it is strikingly beautiful.

Mimusops sieberi, or Wild Dilly, is a nearly related tree from the Lower Keys, with rosettes of handsome leaves clustered at the ends of the branches, rounded or retuse at the apex. They are bright red when young but become leathery and deep glossy green above at maturity. The small flowers are followed by globular fruits an inch or more in diameter covered with rusty scales. It is a striking and handsome tree.

The Geiger Tree, a native of the Keys, (Cordia sebestena) is probably the handsomest flowered wild tree of South Florida. It has large, rough, pointed leaves which are sometimes cordate, and salver shaped flowers in large heads that are a brilliant orange or flame color, and they appear irregularly throughout the year. It may be grown from cuttings readily.

Crescentia cucurbitana or Black Calabash Tree is common in hammocks and swamps, only along the shores of Biscayne Bay in Florida, although it is found in the Bahamas and West Indies. It has handsome, large thick, glossy leaves. Its flowers are trumpet shaped and purplish, and are followed by oval, green fruits three or four inches long.

There is a small tree found on the Lower Keys called Prince Wood (Exostema caribæum) with elliptical, pointed, shining leaves and long, fuchsia-like white or pinkish tinted flowers that is an elegant thing. A fine specimen of it may be seen planted by Dr. John Gifford in his grounds at Cocoanut Grove.

We have an elderberry, a large bush or small tree, native of Dade County (Sambucus sp.) which may be undescribed. It has exceedingly large, fine heads of pure white flowers and is really very attractive.

NATIVE ORNAMENTAL SHRUBS

Two handsome shrubs grow in this region around the borders of hammocks, Hamelia patens, with elliptical, pointed, red tinted leaves and clusters of elegant orange scarlet, tubular flowers, and Erythrina herbacea with trifoliate leaves and elongated, purplish crimson flowers. The former is in flower nearly the entire year and is really one of the most desirable shrubs I know of for this region, as it flourishes when planted in the pine land without either attention or fertilizer. The latter is an awkward grower and opens its blossoms in late winter and spring. An arboreal form grows in Florida which has received the name of Erythrina arborea, but I do not know that it grows in Dade County, though it probably does.

NATIVE ORNAMENTAL CLIMBERS AND CREEPERS

The well known woodbine (Ampelopsis quinquefolia) is one of the few plants common to the Northern States and extreme Southern Florida. It springs up in cleared pine land and often almost becomes a nuisance. It climbs to the tops of the loftiest pines and along in January or February its foliage takes on the rich crimson color that it has after frost in the Northern States.

Chiococca racemosa is a sprawler in the hammock and bears racemes of lemon yellow, honey-scented flowers which somewhat resemble those of the Lily of the Valley. Later it becomes covered with white, waxy berries which remain on all winter.

Several native Ipomoeas bear handsome flowers, the most conspicuous being Calonyction bona-nox, the magnificent night bloomer, cultivated in the north under the name of moon flower. It grows along the borders of hammocks, creeping over the ground and bushes or even to the tops of lofty trees. A variety here bears flowers which remain in bloom until late in the forenoon, or nearly all day if it is cloudy.

Ipomoea pes-caprae (Goat's-foot) has astonishingly long, vigorous stems which trail along sandy shores, bearing large, glossy, handsome leaves that are cleft at the apex, hence the specific name. The large purple flowers are very fine. If introduced into ordinary pine land it makes itself as much at home as along the seashore.

Ipomoea dissecta has delicately cut leaves and handsome, whitish flowers having a purple eye, and is quite commonly used here to cover piazzas and arbors.

Another species, Ipomoea fuchsioides, comes from the Homestead Country of Lower Dade, where it grows in crevices among the most ragged limestone rocks. It has elongated leaves which are rounded at the base and quantities of brilliant purplish crimson flowers. These are about an inch or a little more in diameter, their buds looking as though varnished, and are indescribably beautiful. It does not seem to flourish when planted out in this vicinity. Perhaps the abundance of soil, even if it is poor, proves too stimulating for it.

Another plant belonging to the Convolvulus family, the Jacquemontia pentantha, from the Lower Keys, is very fine. It has glossy, cordate leaves and rather small, funnel shaped, blue flowers, each having a white eye. It does not last very long in cultivation, being probably an imperfect perennial, but like the companion vine, Ipomoea fuschioides, it is worthy of a good deal of care.

Along the seashore in the edge of hammocks there grows a rampant, prickly vine with bipinnate leaves, yellowish flowers and short, inflated pods covered with thorns, each containing two or three rounded, gray seeds, the nicker beans. It is Guilandina crista and does well when planted in a sheltered location.

In the West Indies every black man who has a bit of ground plants a few seeds of Canavalia obtusifolia or C. gladiata. These are the "Overlook peas" and it is absolutely necessary for one's safety that he have one or the other of these vines growing on his place in order to prevent his garden being "overlooked" or bewitched by the Evil Eye. Both are pretty and interesting naturalized vines, with rather attractive purple, pea-like blossoms, the former being more inclined to trail and the latter to climb. I am always careful to have my place well protected from anybody who may wish to "hoodoo" it.

There are two balloon vines growing wild in waste places in this region (Cardiospermum halicacabum and C. microcarpum). Both are pretty, delicate vines with compound leaves and triangular inflated seed pods.

One of our wild grapes with small glossy leaves (Muscadinia rotundifolia) grows in the edges of hammocks and comes up from seed in the cultivated pine land to an extent that is anything but agreeable. It is a rampant grower and when it hangs over the edges of the hammocks it looks well. One of these vines has covered a solitary live oak in my grounds and hangs in long streamers all around it and looks like an uncommonly fine white elm.

Rhabdadenia biflora is a wonderfully vigorous vine that grows in salt marshes, either sprawling or climbing, often to the tops of lofty trees. Its flexible, woody stems are smooth and brown; it has elongated, thick, glossy leaves which are opposite, and handsome creamy white, funnel shaped flowers in pairs. The center of the waxy flower is yellow and it is richly fragrant. It is full of milky sap and it is predicted that it will be an important rubber producing plant in the near future. I have no doubt that it would grow on higher ground if it was well cared for.

Vanilla planifolia, the plant producing the vanilla of commerce has been credited to South Florida, I think erroneously. We have a species growing here in the hammocks (Vanilla eggersi) which has large, fleshy stems and the leaves reduced to mere scales, which climbs trees by means of adventive roots. It bears great heads of brownish purple flowers which are fragrant and handsome. It is an odd and attractive plant.

NATIVE HERBACEOUS ORNAMENTALS

In the tropics the proportion of herbaceous plants is less than in cooler regions. In Dade County there is quite a number of ferns, several of these having been found recently in Florida for the first time by botanists exploring in the Homestead region.

Osmunda spectabilis, a noble, yet delicate fern, is abundant in swamps and is believed by some authorities to be the same as the Osmunda regalis of Europe.

Our largest native fern grows everywhere in brackish swamps (Acrostichum excelsum) and sometimes reaches a height of 8 feet or more. It is a

bold, handsome plant with heavy stipes on which the fronds are pinnately arranged. It is a question in my mind whether it does not run into A. aureum, which is generally believed to be distinct.

In the hammocks everywhere the trunks of the live oaks are more or less covered with a lovely little fern with creeping rootstalks and pectinate fronds (Polypodium polypodioides). In dry weather its fronds curl up and even turn brown and become so brittle that they easily break up. With one-fourth of an inch of rain or even less they open out, turn to a rich dark green, and cheerfully grow on as though nothing had checked them, only to close up and become brown when it turns dry again.

With something of the same habit its near relative (P. pectinatum) is even more beautiful, but is a much rarer species. Mr. John Soar and the writer found it on Pumpkin Key growing on dead logs or the ground and I have attached it to trees in my hammock where its lovely fronds, cut into teeth like a comb, open or close up and turn brown according as the weather is damp or dry.

The Hounds Tongue Fern also grows for the most part on decaying wood in the hammocks. It was formally called a Polypodium but is now Campyloneuron phyllitidis. It has lovely, entire linear fronds, reaching a height of three feet and is a striking plant whether hidden away in the half twilight of the hammocks or grown in pots or vases.

Another rather rare fern which resembles the last but has wider fronds is Asplenium serratum, the edges of the fronds being finely serrated. The last, though, occasionally grows to a considerable distance up tree trunks in damp hammocks.

Phlebodium aureum is entirely epiphytal in its habits, growing mostly on the trunks of cabbage palmettos, where it forms knotty rootstalks and throws out its bold, large, deeply cut fronds.

Nephrolepis exaltata, the Sword Fern is equally at home in the ground of hammocks, on rocks, or high up under the crowns of palmettos and is very abundant in many places.

A rarer species is Nephrolepis biserrata, which grows in damp ground with fronds reaching sometimes a length of ten feet. It is often found on palmettos.

A lovely fern that grows on palmettos might be taken for a tuft of grass, hence its name Grass Fern. Its fronds are linear, leathery and glossy above, with edges slightly revolute. It is Vittaria lineata.

The Adiantums are all exquisitely beautiful, but A. tenerum is especially delicate. It is found in hammocks in the Homestead region and does well in cultivation if kept damp and shaded.

At the head of the Miami River is found a large, bold fern (Meniscium reticulatum) which at first glance might be taken for an Acrostichum. It is a West Indian species and I have a fine specimen in my hammock which was brought by Mr. John Soar from

the Isle of Pines. The late Mr. A. A. Eaton was very much interested in my plant but later when he discovered the same thing growing in quantities near the Miami pumping station, remarked that he thought Mr. Soar had been "Carrying coals to Newcastle."

There are several fine Dryopteris growing wild in Dade County, D. patens being abundant on the banks of ditches. D. thelypteris in mucky, fresh water swamps, and a grand species D. ampla, was found in the hammock in the Homestead Country which has an erect rootstalk and is in reality a tree fern.

There are many other species here which are well worthy of cultivation but I cannot mention them on account of lack of space.

Two species of fine epiphytal orchids grow in the neighborhood of Miami, Epidendrum tampaense, which in early summer has airy panicles of very pretty brownish flowers, which are variegated with white and purple, and Cyrtopodium punctatum which is not so common. The former has thick linear leaves, while those of the latter are broader and thin. The matted roots turn upwards forming a sort of basin which catches falling leaves, insects and the like and no doubt thus fertilizes the plant. It has tall, branching flower stems and greenish yellow flowers spotted brown in great abundance. On Paradise Key a variety of Oncidium luridum is found on trees which has heavy, thick leaves and flowers that superficially resemble those of Cyrtopodium, and in the Homestead hammocks O. sphacelatum is almost terrestrial.

A lovely Peperomia, P. magnoliæfolia, with very thick, obovate leaves and rat tail spikes of greenish flowers is epiphytic on the live oaks.

One of our Tillandsias, T. fasciculata is a splendid ornament of the hammocks in spring. Like other species its seeds are furnished with cottony tails with which they are carried by the wind and by means of which the seed attaches itself wherever it strikes and germinates. This species has flattened heads of brilliant red bracts out of which come slender, deep blue flowers and when in bloom they gleam like spurts of fire among the trees.

Guzmannia monostacha is a handsome epiphyte, excessively abundant on trees in the Homestead hammocks. It is a relative of the Tillandsias and bears heads of brown, white and rich red flowers. A variety has elegantly striped leaves. They sometimes grow so abundantly as to break the limbs to which they are attached.

Three species at least of century plants grow wild in Dade County, Agave sisalana, A. rigida and A. neglecta. All are striking, tropical looking plants and are often cultivated.

In fresh water and slightly brackish swamps Crinum americanum lights up the dreary waste with its splended starry white flowers. Associated with it are several species of Hymenocallis, with broad, soft leaves and heads of spider-like satiny flowers, the stamens being connected by a thin, gauzy cup.

They will flourish if planted in dryer land.

Another beautiful swamp plant is Hibiscus grandiflorus, with velvety lobed leaves and immense pink flowers. It may be propagated from seed or cuttings and I have established it in my low land.

Kneiffia riparia, belonging to the evening primrose family, is a fine, branching plant growing in wet land along streams, and bearing continually large yellow flowers.

CULTIVATED PALMS

Dade County seems to be a veritable paradise for palms. I have about 150 species native and exotic and nearly all of them promise well. Nothing can be finer as single isolated specimens or groups, or when planted in mixed masses, than the palms. Many of the finer species are as yet unattainable or can only be had with difficulty and at great expense. I have imported many plants which have nearly all died on account of the long voyage, and seeds which have rarely germinated. But there are many fine things for sale at our home nurseries now that were unattainable a few years ago, and are being offered at reasonable prices. I will begin with the pinnate palms and go through the genera in alphabetical order.

Archontophœnix alexandræ (known as Ptychosperma alexandræ) and A. cunninghami (Seaforthia elegans) are elegant species offered by many dealers. In the former the underside of the leaves is a little more silvery than in the latter, and the arching leaves do not turn up edgewise. They grow to considerable size and will do well in the sunshine but should be planted where they are protected from the winds, as the leaflets break up very badly when blown about.

Areca. I have had several species of these fine palms. So far I have not been able to make A. catechu, the Oriental Betel Nut, succeed.

A. glandiformis is a grand palm, and is doing splendidly with me.

A. aliceæ and A. triandra promise well, though I think likely the latter should be grown in the shade.

Astrocaryum. I have only one species (A. mexicanum), planted in the hammock which is growing slowly but is in good health. The under sides of the leaves are a fine, silvery color and the petioles and trunk are spiny.

Attalea. A. cohune is a magnificent species from Central America. I have seen it in Honduras over 100 feet high and Mr. O. F. Cook of the Department of Agriculture tells me he has measured leaves of it 55 feet long. They shoot up almost straight for a great distance, then curve out slightly at the tips. Commodore Monroe has a fine specimen at his home in Cocoanut Grove which is beginning to form a trunk. It is a slow grower when young and has one drawback when matured, and that is that the old leaves hang on to the plant and disfigure it. I have plants of A. gomphococca which are doing well.

Acrocomia. A genus of very spiny palms with slender leaflets. I have

young plants of A. media, A. sclerocarpa and A. totai, all of which are doing well in the sun on pine land. I have what may be A. havanensis from Cuba which has an immensely swollen stem.

Bactris. Excessively spiny palms which are, however, quite ornamental. The leaves seem to suffer from cool weather and come out in the spring here in bad condition. I have B. gasipaes, the Peach Palm of Brazil, B. aurantiaca and an unnamed species.

Caryota, Carat or Fish-tail Palm. I have several species. C. blancoi, C. mitis, C. purpuracea, C. sobolifera and C. urens. C. mitis and sobolifera sucker profusely and these suckers may be used for propagating if taken off carefully after they begin to throw out roots. All the species bloom only when fully matured, beginning to throw out their magnificent tassels. (in C. urens as large as a man's body) immediately under the leaves and continuing downward to the base of the stem, when the plant dies. I have had best success with them when planted in the shade as they seem when in full sunshine to be particularly subject to blotching of the leaves.

Chamædorea. Slender, often reed-like, dioecious palms sometimes throwing up suckers. They should be planted in deep shade where they grow nicely and bloom every year. I have C. arenbergiana, C. corallina and one or two others.

Chrysalidocarpus lutescens is a handsome, popular palm, better known as Areca lutescens. Its rather slender stems and the petioles have a yellowish tint; it suckers freely and when well grown is elegant. For some reason I have had poor success with this palm until lately but it is now growing well in pine and hammock land. It is quite tender.

Cocos. A genus of many American species, one of which, the cocoanut, I have already mentioned. The other species here are subject to a peculiar leaf blight which forms brownish streaks and sometimes kills quite large plants. Aside from this most of the species do well here and nearly all are somewhat hardy. I have an unnamed species in my grounds, said to come from Cuba, which is exceedingly fine, being a miniature of the big cocoanut. I have never succeeded with C. insignis and weddelliana here, either in pots or in the open, and it may be that the lime in our soil is injurious to them.

Desmoncus major is a thorny, slender palm from the lower West Indies where it climbs and holds on by means of hooks at the end of the pinnæ. It is called "Croc-chien" in its native country, a name meaning "the teeth of a dog," in allusion to the dreadful way in which it seizes and holds on to any one running into it. I have a fine young plant in the hammock which is doing well and is just beginning to develop teeth.

Dictyosperma rubra and D. alba are fine palms, medium-sized, with rather slender stems. I have a fine specimen 12 feet high of the former and it has repeatedly fruited at Palm Beach. In

the open its leaves are quite red when young but they change to green with age. Both species do well in the shade or sunshine.

Dypsis madagascariensis. A slender, reed-like palm with the pinnæ arranged in fascicles. It is doing well with me in shade and sunshine.

Elæis guineensis. The Oil Palm of tropical Africa. It has bloomed and borne fruit for me and does moderately well, though I think our winter climate is a little too cool for it.

Euterpe. I have had several species of this genus, but for some reason all have died. It has often happened that where I have utterly failed with certain plants, others have succeeded, and that I have succeeded after repeated failures. These may do well here.

Howea. H. belmoreana and H. forsteriana, better known as Kentias, are offered by many dealers. Neither seems to do really well here though the latter does the better of the two. The lime in the soil may not be congenial for them.

Hydriastele wendlandiana. A tall growing palm with long leaves, the segments being truncate and ragged at the apex. It is a vigorous grower and promises well here.

Hyophorbe verschaffeltii and amaricaulis are two very striking and handsome palms from Mauritius. They are lofty growers, with large, bulging trunks, rather stiff, richly colored and orange tinted leaves. Both are growing finely for me in shade and sunshine.

Jubæa spectabilis. The southernmost palm of South America. I have had poor success with this palm which I have started from seed several times. I now have a specimen sent from California four years ago which looks healthy, but has only made one leaf in all that time. At that rate I shall be a very old man before it becomes a tree.

Kentia. The genus Kentia has been completely dismembered and the nomenclature seems to be badly confused. For want of any better knowledge I shall refer to it a fine species which goes under the name of Kentia macar thuri. It grows in large clumps with rather slender stems and obliquely truncate leaflets. It is a rapid grower and soon forms a large clump, but it is a little tender and I am inclined to think it would flourish best in a somewhat sheltered and shaded place.

Martinezia caryotæfolia, the only species I have tried to grow, is a slender palm and does not seem to do very well. It is slightly spiny, has elegant leaves with the broad segments raggedly truncate, and it grows quite rapidly in pots when young.

Phoenix. The Date Palms. I have some 20 or more nominal species of this genus and there are no palms known to me which are any more satisfactory in every way for planting in Dade County. They all grow rapidly even when mere seedlings. They flourish in all soils from low salt marshes which are occasionally overflowed to the highest, driest pine land, and all will grow rapidly and do well without fertilizer. They are dicecious, and a large proportion of my plants have proven to be males. The

great clusters of creamy blossoms are quite attractive. A female P. humilis has borne fruit which has germinated and made fine young plants. As it is the only specimen of the species I have, and no other males of any species were in bloom anywhere near it at the time it flowered, it seems probable that it was self fertilized. P. canariensis is a majestic palm with a colossal trunk and leaves 10 to 12 feet long. P. sylvestris is fine, while P. roebelenii is the gem of the genus. It is very distinct in appearance, with delicate leaves of a peculiar green, and rich yellow spines. According to W. M. in Bailey's Cyclopedia of Americana Horticulture this has stems only two or three feet in height in 20 years. My best specimen, set out as a little plant about four years ago, and badly crowded and robbed by a Ficus elastica, without fertilizer, is now five feet high, has a trunk three feet high and five inches in diameter and is in bud for blossom. (For a fine article on "Phoenix in Florida" by H. Nehrling see the above quoted work, Vol. III, p. 1309.)

Raphia ruffia. I have this palm but am not at all sure it will succeed. It grows very rapidly as a seedling but does not seem to do well when larger. It is a fine species from Madagascar with immense, nearly erect, pinnate leaves and enormous heads of fruit weighing from 200 to 300 pounds.

Roystonea. Besides our native species already mentioned we have R. oleracea from the West Indies, a magnificent species growing to a great height and R. borinquena from Porto Rico. Both are doing well with me; the latter is growing very rapidly and promises to do better on the pine land than R. regia. It has a stouter, more fusiform trunk than R. regia and heavier leaflets.

Stevensonia grandifolia. I have not been successful so far with this magnificent palm, largely owing to the fact that it seems to be very tender in a young state, but I hope to succeed with it later.

Verschaffeltia, another fine palm, has also proved very tender.

Wallichia. I have had W. densiflora and W. caryotoides but neither of them have succeeded and it is quite likely that our limestone soil does not agree with them.

PALMATE LEAVED PALMS

Corypha. I have had three species of this genus, C. umbraculifera, C. gebanga and C. macropoda, but none of them have done well with me.

Chamærops. A circum-Mediterranean genus of elegant palms. Probably only a single species exists in Europe, though botanists have made many nominal species. This is C. humilis, and a form from northern Africa which is more robust has received the name of C. macrocarpa. I have fine large plants of the former and small ones of the latter, all of which are doing well. They are rather slow growing when young.

Erythea edulis, a fine, densely leaved fan palm from Guadalupe Island, Lower California. So far it is a moderate grower, but is in perfectly

healthy condition on pine land and is making a fine ornament.

E. armata, the Blue Palm of Lower California is a still finer species. I have small specimens of it which promise well.

Hyphaene. I have a single plant of H. shatan about seven feet high and beginning to form a trunk. The heavy curved petioles are black bordered and have very large, crooked, black spines along them, and the midribs are sharply recurved. The immensely thick blade is attached diagonally to the petiole. Two or three times this specimen was nearly killed by frosts but now it seems to be well established and is growing with the greatest vigor. The species of this genus form branching trees, and the outer rind around the seed is sweet and tastes like gingerbread, hence the name "Gingerbread Palm."

Inodes. The species of this group were previously referred to Sabal, but O. F. Cook has shown that they are not the true Sabals. One obvious distinction is that in Sabal the leaves are nearly or quite flat, while in Inodes the midrib is curved backward. It is as satisfactory a group of palms for this region as the Phoenix and that is saying all that can be said. I. ghiesbreghtii is one of the finest, with large leaves of unusually heavy texture I. mauritiæformis of the West Indies and northern South America is said to have leaves 12 feet across. All are well worthy of cultivation, as they flourish on almost all our soils even without fertilizer.

Latania. A genus of a few species from Mauritius and vicinity, containing some of the most noble palms on earth. They have large trunks and immense leaves supported by massive petioles, the whole often glaucous and highly colored. L. glaucophylla is the finest species, and magnificent specimens of it are growing in Miami and at Cape Florida. L. commersonii is also a grand species and is growing at Cape Florida. The species are dioecious.

Licuala. A genus of East Indian palms, several of which I have tried to cultivate with indifferent success. They grow for a while and then get sick and almost stand still.

Livistona. Another genus of East Indian palms but one which does much better here than Licuala. L. chinensis is usually sold as Latania borbonica, which is quite a different thing. It is a slow-growing fan palm with very glossy leaves but after it reaches considerable size its growth is more rapid. It is rather hardy and attains considerable size and is a most excellent and useful palm. L. subglobosa is a rapid grower. L. hoogendorpii is doing well. L. australis is a slow grower but quite hardy, and is a picturesque tree. L. rotundifolia is beautiful but seems a little delicate.

Neowashingtonia. I have three species of this Mexican genus. N. robusta, a magnificent, strong-growing palm with large glossy leaves which have stout prickles on the edges of their petioles. It is rapidly becoming a favorite here for street planting. N.

filifera has dull colored leaves and is greatly inferior in vigor and beauty to the robusta. N. sonoræ, of which I have young specimens, is said to be more delicate than the others.

Pritchardia. A noble genus of palms from the South Pacific containing a few species fully as handsome as the Latanias. They have immense plaited leaves borne on heavy petioles. P. pacifica has the petioles covered with a creamy or whitish fluffy scurf. P. thurstoni and an unnamed species which I have are very fine. Unfortunately they are all exceedingly tender and even large plants are injured by sharp frosts.

Rhapis humilis and flabelliformis are clustered reed palms from China, and are exquisitely beautiful. The former does better for me than the latter.

Thrinax. There is no group of palms more completely adapted to South Florida than the species of this and allied genera. No less than six species of Thrinax and Coccothrinax grow wild in Dade County. T. barbadensis is an elegant palm which is deeper colored in shade than in sunshine, though it does well in both situations. T. altissima is altogether one of the most beautiful palms I have ever seen. Its large, glossy, airy leaves are almost flat and their lower edges lap over at the petiole. All the species, however, are tender when young.

Thrincoma alta, a new palm from Porto Rico, does well, and promises to be a beautiful little tree. All the species of this group do well in hammock or pine land and need no fertilizer.

Trachycarpus excelsus totally fails in this locality. I have planted it repeatedly in different soils and situations but it invariably soon dies. I am satisfied that the soil does not suit it.

ORNAMENTAL EXOTIC TREES

Adenanthera pavonina, Circassian Bean, is a pretty tree from India with delicate compound leaves and small brownish or yellowish flowers. These are followed by spiral pods with brilliant red, polished, lenticular seeds. They are an article of food in India and are used extensively for necklaces. They may be strung readily with a heavy needle and thread or twine just as they are ripening, turning from cream color to scarlet. If strung too early they shrivel, but they soon begin to harden and cannot be worked at all.

Acacia. Elegant trees with delicate compound foliage and often pretty heads of flowers, but unfortunately only a few of them do well here. A. bicornis or cornigera, from Mexico and Central America which bears elongated heads of yellowish flowers and immense spines in pairs, united at the base and looking like the horns of an ox, does fairly well and two or three unnamed species flourish.

Araucaria. A noble genus of warm temperate or subtropical conifers. A. excelsa is often grown in Dade County, though quite tender when young. This is the Norfolk Island pine, very commonly cultivated in pots and tubs at

the north and when in perfect condition is one of the most strikingly beautiful trees in the world. It does fairly well here on pine land that is well drained, and occasionally there are seen remarkably handsome specimens. A. bidwillii from Australia is another noble species with broad leaves which seems to be completely at home in our poor soil. I have a young A. braziliana which is doing well. A. imbricata has been tried repeatedly by myself and others, in shade and sunshine and in various soils but it has invariably died.

Albizzia lebbek becomes a noble, wide spreading tree here in a very short time. Its common name "Woman's Tongue" was given it because the pods of the one and the tongues of the other are supposed to rattle, a gross libel on both.

Aleurites. Candle nut tree. A genus of trees of majestic appearance and large, striking leaves. A. moluccana has handsome lobed leaves and bears an excellent edible nut. It has borne fruit in Dade County. A. trisperma has very large cordate leaves and is a beautiful tree. It is from China and is perfectly hardy. All three flourish here like weeds, the only drawback being that their rather brittle limbs break up badly during hurricanes, and they should therefore be planted in sheltered locations.

Andira inermis, West Indian Cabbage Tree, has elegant pinnate leaves with wavy leaflets and is said to bear handsome purple flowers. It is a beautiful tree but so far I have not been able to make it succeed as well as I would like to.

Bauhinia. A large genus of tropical trees and shrubs generally having showy flowers. B. purpurea is one of our finest trees, being covered with large orchid-like blossoms in late winter and spring, most beautifully variegated. One of these trees in full bloom is a sight worth going a long way to see. B. alba and B. furfuracea have handsome white flowers, both blooming at various seasons. B. triandra has lovely pink flowers striped with white. B. tomentosa has yellow flowers. I have a large growing unnamed species that bears a great profusion of whitish blossoms tinted purple through the late fall and winter. The curious leaves of all the species which are more or less bifid at the apex are attractive. They all do well here in our light soil but should be liberally fertilized for best results.

Bombax. Silk Cotton tree. A soft wooded, rapid growing tree of the West Indian region, attaining immense proportions. It has digitate, deciduous leaves and the stems and trunk bear strong prickles. In late winter when the tree is nearly or quite naked it becomes covered with very large showy red flowers. It does well in Dade County. At the Royal Poinciana Hotel at Palm Beach are very large specimens for Florida.

Bischofia trifoliata from the East Indies is a rapid-growing tree with handsome trifoliate leaves which flourishes finely here.

Bixa orellana, a West Indian tree has cordate leaves, pink flowers like immense and glorified peach blossoms, and soft, prickly pods whose seeds are covered with an orange red paste. It is the Arnatto or Roucou, and the paste is used alike to decorate the bodies of South American Indians and to color the butter and cheese of civilized man. It does fairly well if fertilized.

Butea frondosa. An Indian tree with very large trifoliate leaves and red flowers. Sir Joseph Hooker in the Himalayan Journals says "In the Soane Valley Butea frondosa was abundantly in flower and a gorgeous sight. In mass the inflorescence resembles sheets of flame and individually the flowers are eminently beautiful, the bright orange-red petals contrasting brilliantly against the jet-black, velvety calyx." I have repeatedly failed with this tree but at last a specimen planted in the edge of the rocky hammock in a rather dry place is doing finely.

Cassia fistula has handsome, large pinnate leaves and drooping leaflets, and long, pendant, pale yellow clusters of flowers. When in bloom it is one of the most charming of objects. There is a fine specimen at the Sub-Tropical Laboratory near Miami.

Caesalpinia sappan is a rather attractive, thorny tree with fine, bipinnate leaves, yellow flowers and striking seed pods, which does well here. C. coriaria is a tree with delicately beautiful compound leaves and greenish, fragrant flowers, a little tender when young, but it will probably do well when established. C. gilliesii so far has not done well.

Calophyllum inophyllum, a noble tree from the East Indies has fine large glossy leaves and large handsome white flowers. It is very tender here but probably will do well when it is once established.

Castilla elastica. This is the Central American Rubber Tree and I have seen specimens of it in southern Cuba that were fine. It grows well here in summer but the cool weather and especially frosts put it back badly.

Crescentia cujete. An awkward growing tree with long, narrow leaves and not particularly ornamental, but it bears curious, purplish, trumpet shaped blossoms on the main stem and large branches, which produce the celebrated calabashes, used everywhere in tropical America. It is a rapid grower, but is very tender, and will do well here when large.

Delonix regia, the Royal Poinciana, vies with one other tree (Amherstia nobilis) for the position of King of Flowering Trees. It is a native of Madagascar, but long ago was carried all around the tropics and cultivated for its glorious flowers and foliage. Its marvellously beautiful bipinnate, dark green leaves alone would give it a high rank among ornamentals. These come out a pale, delicate green in April and at the same time the tree is covered with great masses of bloom, each flower being four inches or more in diameter. The outside of the thick petals is yellow, the inside is red. The petals are clawed, a rich warm red and

often variegated inside. It blooms, in some cases, at intervals well into the summer and some trees bear clusters of flowers that would not go into a half bushel basket. There is considerable variation in growth and bloom, and one form is always low growing and wide spreading and is certainly a distinct variety if not a separate species. The immense pods are striking and rather ornamental, and the trees are readily grown here from seed and flourish in all kinds of land except that which is quite wet.

Enterolobium cyclocarpum is a handsome tree with bipinnate leaves, greenish flowers in heads, and pods bent back in a complete circle. A rapid grower.

Erythrina. Coral Tree. A genus of leguminous trees with several species, all with trifoliate leaves and handsome red flowers. The stems and trunks are prickly. They are deciduous in winter and in late winter or early spring bear large spikes of dazzling flowers. Here they are troubled with a brownish borer which enters into the ends of the growing branches and the large flower buds so that the trees bloom but little. If the ends of the limbs which are bored are cut back to healthy wood as soon as the leaves fall there will be a much better show of bloom. They grow well in our sandy soil. I have E. carnea, E. velutina, E. umbrosa and one or two others.

Eriodendron, Silk Cotton Tree. E. anfractuosum, probably, is cultivated here. It is a strikingly handsome tree with a columnar stem, smooth, variegated green bark, limbs in whorls and digitate 5-9 foliate, smooth leaves. The flowers are yellowish and attractive The tree grows to a great size and does finely here but the wood is brittle and breaks in storms.

Euphorbia tirucalli is a small tree with pendant, succulent branches, milky juice and very small leaves. It is a strange and attractive plant. E. antiquorum has triangular, variegated branches, almost no leaves, is spiny, and is a strange looking small tree to northern eyes. Both do well here in poor dry soil but are tender when small.

Eucalyptus. A large genus of trees from the Australian region, many of which attain an enormous height. Quite a large number of species are grown in Dade County where most of them do well. E. robusta is a broad leaved, fine species, quite ornamental in bloom. E. ficifolia for some reason has not done well with me. It has handsome scarlet flowers. E. rostrata, E. viminalis and many others have no true leaves, bearing only phyllodia, or leaflike expansions of the petiole, alike on both sides, and set edgewise on the tree instead of horizontally. E. globulus has true leaves when young and phyllodia when mature the latter being wholly unlike the former.

Ficus. An immense genus ranging from warm temperate regions through the tropics and from lowly creepers to lofty trees. Nearly all the many species introduced here do well. F.

altissima is one of the best. F. nymphæfolia has enormous cordate leaves. F. religiosa is the sacred Ti tree of India. F. benghalensis is the Banyan and F. pumila and barbata are creepers which will cover walls or trees.

F. elastica is the well known India Rubber. A specimen of this tree grows in Lemon City having a head a hundred feet across. The variegated variety is very fine. F. parcelli has also attractive variegated leaves.

Garcinia morella. A handsome tree with long, leathery, glossy, opposite leaves and yellowish flowers. The gamboge of commerce is made from it. The mangosteen (G. mangostana) will not grow here but the gambage promises well.

Gliricidia. Two species of this leguminous tree promise well here, G. platycarpa from Cuba and G. maculata of Central America. The latter has bloomed beautifully here. Both have handsome pink flowers, but are tender when young.

Grevillea robusta. Australian Silk Oak, is grown in great quantities in the north as an ornamental plant, having elegant fern-like leaves. Here it becomes a large tree, bearing in spring great clusters of strange, handsome, golden flowers. G. hilli is somewhat similar to robusta but has pink or white flowers.

Heterophragma adenophyllum is a tree becoming 50 feet high, from India, having digitate leaves and brownish yellow, woolly flowers. The long pods are spirally twisted. I have a fine young tree on pine land which gives good promise of soon furnishing corkscrews for all of Dade County.

Hura crepitans, Sand Box of the West Indies, is a large tree with elegant cordate leaves, inconspicuous flowers and flattened, ribbed seed pods, which burst with a loud noise when ripe. It is grown here but does not generally succeed very well.

Jacaranda mimosæfolia is a Brazilian tree with charming compound leaves with innumerable small leaflets. When young it grows quite well, but as soon as it reaches a considerable size it does not generally flourish. It has handsome blue trumpet-like flowers.

Kigelia pinnata is a pinnate leaved tree from tropical Africa related to Bignonia. It has large, dull red, trumpet-shaped flowers and sausage-shaped fruits, suspended by long stems. There is a large tree at Cocoanut Grove, on high, rocky land.

Lagerstrœmia flos-reginæ. A superb tree bearing enormous fascicles of rose purple flowers. It is very much larger and finer in all its parts than the ordinary crape myrtle (L. Indica). There is a fine specimen on the place formerly belonging to Rev. Thomas Spencer, near Miami.

Magnolia. Magnolia fœtida (grandiflora) does not grow wild as far south as this, but I have a young tree in the edge of the swamp that is doing well. M. glauca is common here in swamps.

Melaleuca leucodendron, the Cajeput Tree, grows finely here, either on high or swampy land. It is an attract-

ive tree with lanceolate phyllodia and small white blossoms. The bark is very thick and remarkably spongy. The leaves are strongly scented.

Melia azedarach umbraculiformis, Texas Umbrella Tree, is common here, but as a rule does not reach the perfection it does in North Florida. M. sempervirens, said to come from Jamaica, though probably originally from the Orient, is an elegant, rapid growing tree, here nearly always in bloom. The trees of this genus are subject to soft scale which can be killed with kerowater.

Moringa moringa, is a tree, native of India but now widely distributed in the tropics. It has airy, compound leaves and clusters of somewhat pea-shaped, white, fragrant flowers and is always in bloom. It bears long, curious, triangular pods. The whole tree has a pungent odor and taste and the soft roots, as large as a man's arm, make an excellent substitute for horseradish, hence the name Horseradish Tree.

Pachira. A genus of handsome trees from tropical America with large glossy, leathery, digitate leaves and showy flowers. P. princeps has white flowers with red stamens and grows in brackish swamps. P. macrocarpa has very large white flowers. P. fastuosa from Cuba drops its leaves in winter and in February is covered with immense crimson blossoms, one of the handsomest trees I ever saw. I have a tree of another species which I cannot determine, that has white nocturnal flowers. All grow here finely in the pine land.

Pandanus. A large genus but the only one we cultivate that I am sure reaches the proportions of a tree is P. utilis, commonly called the Screw Pine. It is a most striking and tropical looking object. The nearly smooth trunk is copper colored and marked with the scars of fallen leaves. It is supported at the base by many large air roots. The branches usually come in whorls of three, and the long, folded, spiny leaves are arranged in a perfect spiral. The tree is dioecious, the flowers are large and strange, and are followed by immense, nearly globular heads of seeds which are glossy and highly colored. I have a female tree near my house which now has three of these great seed heads, each larger than a man's head and very heavy. Taken in all, I know of no plant more astonishing in appearance than this, for it seems to be a combination of vagaries in every part.

Parmentiera cerifera. Candle Tree. This is another of the vagaries of the tropics. It is a tree with winged trifoliate leaves from tropical America. It has large white trumpet shaped flowers and long, cylindrical yellow fruits which very greatly resemble candles, and they hang in profusion from the branches. They are said to be edible. Will probably do well here.

Peltophorum ferrugineum. A tree with handsome bipinnate foliage, a rapid grower and a native of Ceylon. The young leaves and shoots are cov-

ered with a brown, velvety tomentum. It bears rusty yellow flowers twice a year and they are fragrant. Macmillan in Tropical Gardening, says that it is a magnificent sight when in full bloom.

Pimenta vulgaris, the well known Allspice is a handsome tree, native of Jamaica, with long, shining leaves. Every part of it is rich in the flavor of allspice. I have a tree eight feet high planted in the thick scrub of the hammock which is growing finely.

Plumeria, Frangipani. I have three species, P. alba, with white flowers. P. acutifolia, flowers pink and white, and P. tricolor, flowers white, yellow and red. The thick, succulent stems of these small tropical American trees lose most of their leaves in winter. The flowers of all are deliciously fragrant, and from them frangipani is made. A magnificent specimen of the latter species is growing in the grounds of Commodore Monroe at Cocoanut Grove. They all do well here but are tender.

Paritium elatum. Cuban Bast Tree. A member of the Hibiscus family, with immense, nearly circular, cordate leaves and large flowers that are a peculiar yellow when they open, but later become brownish red. I have a large tree in the pine land, 40 feet high and as much across, that has been constantly in bloom for more than five years.

Saraca indica is a tree with drooping, glossy, compound leaves that are of waxy texture when they come out, and beautifully colored. The orange red flowers are handsome but it has not done well for me. It should probably have a damp, shady situation.

Schizolobium excelsum. A rapid growing tree from Brazil with splendid bipinnate leaves of immense size and yellow flowers. Will probably succeed here though it is quite tender.

Stereospermum suaveolens, A tree belonging to the Bignoniacæa, having enormous compound leaves and dull red trumpet-shaped flowers. It is doing well for me.

Sterculia. Several species, which do not generally do well here. S. alata with immense oval leaves has proven a failure. I have had S. platanifolia six years and though it seems healthy it is only three feet high. S. carthagenensis is a noble tree, of which there is a fine specimen at the Sub-Tropical Laboratory near Miami.

Swietenia macrophylla. A magnificent tree from the American tropics. It has the largest pinnate leaves I have ever seen. These it retains for a long time and they become highly colored before they fall. It is a vigorous, rapid grower, apparently quite hardy, and my specimen has had no fertilizer though planted in pine land. If it stands wind well I predict that it will make a good tree for planting along roads.

Theobroma, Cacao. A beautiful ornamental tree but very tender and it has utterly failed with me so far.

Terminalia catappa is a common but exceedingly striking tree. Its branches come out in whorls and grow horizontally. The obovate leaves some-

times measure 12 inches in width by 22 in length, and they turn the most wonderfully purplish crimson when cool weather comes. It is unfortunately very brittle. It flourishes in the poorest soil without fertilizer.

Thespesia. Trees of the Hibiscus family, one of which, T. grandiflora, is a fine, rapid grower and promises to do well here.

Thevetia nerifolia is a small West Indian tree with narrow shining leaves and funnel shaped, very fragrant blossoms, yellow or salmon colored. It does well on our pine land but should be fertilized. The whole tree is very poisonous.

ORNAMENTAL FRUIT TREES AND PLANTS

In the north it is considered bad taste to plant fruit trees in one's ornamental grounds as they generally possess little beauty. In the tropics there are many fruit bearing trees which are highly ornamental in foliage, flowers and fruit.

Achras sapota, Sapodilla, is a handsome, evergreen, tropical tree with elliptical, leathery, shining leaves, the branches disposed in whorls. It is a beautiful object planted alone or mixed with other trees.

Artocarpus, Bread Fruit and Jack Fruit. The former with its immense, incised, glossy leaves is, when well grown, one of the grandest objects of nature. There is a fine photograph of this in McMillan's Handbook of Tropical Gardening. It is very tender when young, and I have not yet succeeded with it. There is a fine specimen of Jack Fruit growing in pine land at Cocoanut Grove.

Carica papaya, the common pawpaw is a striking ornamental plant. The cultivated form has larger fruit than the wild one.

Carissa. The specific nomenclature of this group is somewhat confused. I have what may be C. grandiflora and C. arduina. Both have beautiful, thick, glossy leaves and enormous pairs of thorns. The large, waxy, starry, fragrant flowers make a lovely contrast to the deep green leaves and the crimson fruit. They are as completely at home here as weeds.

Cecropia palmata is a rapid growing, awkward tree from the West Indies with immense deeply cut leaves which are silvery beneath. It is a striking ornament and does well here.

Citrus. The orange, the lemon, the tangerine, the grapefruit and especially the kumquat are beautiful ornaments with their rich, glossy leaves, fragrant flowers and golden fruit.

Chrysophyllum cainito (Star Apple). This is as handsome a tree as our wild species and blends finely with other ornamental trees.

Eriobotrya japonica. Loquat, has elegant, large, serrate leaves, is very hardy, and is a beautiful tree.

Eugenia jambos and E. malaccensis, Rose Apple and Malacca Apple are superb ornamentals. The former has long, leathery, glossy leaves and large heads of creamy stamens. It blooms in late winter and spring and it is a sight never to be forgotten to part its branches and peer into the semi-

darkness inside and see its lovely blossoms, gleaming like stars. E. malaccensis has crimson flowers and is a gorgeous tree but is very tender. The former does finely here anywhere.

Mammea americana, Mamee Apple, in a lofty, tropical tree with heavy, glossy leaves and fragrant white flowers. It is very tender when young but becomes a large tree here.

Mangifera indica, Mango. No finer, nobler, ornamental tree is grown in this region. It has a well rounded head of long, leathery, shining leaves and the upright panicles of brownish flowers are quite attractive. It is perfectly at home in our poor soil and would make a fine tree to plant along roads.

Musa. The banana and plantain rank among the most striking and beautiful of tropical ornamental plants. Uufortunately the plantain does not do well here and even the banana does not flourish here with the luxuriance that it does in the tropics. The banana does best in a rich, damp soil, though it does not like to stand in stagnant water, but it may be made to grow finely on pine land if given plenty of fertilizer and cultivation and should be planted freely in ornamental grounds.

Phyllanthus distichus. Otahite Gooseberry. It is one of the anomalies of our vegetation, that our cherries grow on evergreen bushes and our gooseberries on thornless trees. The long pinnate leaves of this tree, curved downward in the middle are indescribably beautiful, and when the new growth comes out it is of a rich, reddish brown color. The tree is rather brittle and should be planted in a protected place.

P. emblica is a very handsome tree with long, wand-like branches and exquisite leaves.

Pomegranate (Punica granatum). It is a beautiful shrub with scarlet, trumpet-shaped flowers and handsome, large red fruit. For some reason it does not always do well here.

Tamarind, (Tamarindus indica). It is a noble tree with finely roughened bark and delicately beautiful foliage. It does well here in pine and hammock.

ORNAMENTAL EXOTIC SHRUBS

It is hard to draw any hard and fast distinction between trees and shrubs. In a general way the latter are smaller and often send up numerous stems from the ground.

Allamanda neriifolia and A. williamsi may be grown as shrubs or sprawlers. The former is one of the most floriferous plants we have here, and is covered nearly all the year with fine, large trumpet-shaped, yellow flowers. So great is the drain on it from constant blossoming that it should be repeatedly fertilized and cultivated to keep it in vigor. It is one of our very best shrubs. A. williamsi is a fine floriferous species.

Aralia guilfoylei is an elegant, erect shrub with glossy pinnate leaves variegated with white, which does well here. I have a plant under the name of A. pulchra with beautiful, glossy, digitate leaves, which promises

well but is probably not an Aralia. It may be an Oreopanax.

Ardisia crenulata is a pretty shrub with crenate, leathery leaves and waxy, crimson berries that remain in perfection a long time. I have not been very successful with it but have had best results by planting it in shade in the edge of the hammock.

Aucuba japonica, Japan Gold Dust Tree. I have totally failed to make this lovely plant grow here. I have kept it in fair condition in a pot but when turned out, even in a shaded location the leaves turn black and it soon dies. It may be either the soil or a too warm climate that is the trouble.

Azalea. None of the Azaleas, Camellias, Rhododendrons or the tea plants will grow for me. No doubt this is on account of the lime in the soil. The Gardenia also fails, probably for the same reason.

Bauhinia. Several species of this charming genus are shrubs and a few are climbers. B. acuminata is a fine shrub with lovely, large, white flowers which blooms throughout the spring and summer. I have a small species received as B. picta, but which is not that. It has handsome, pale yellow flowers, shaped much like those of Abutilon. With a good assortment of Bauhinias one can have flowers throughout the entire year here.

Brunfelsia americana has obovate, shining leaves and yellowish, salver-shaped, fragrant flowers. The tube of the flower is exceedingly long. It does remarkably well here in pine land and is a very free bloomer.

Cassia. None of the shrubby species I have tried have done well.

Caesalpinia pulcherrima is a favorite shrub in South Florida and well it may be. It is easily grown from seed and it flaunts its gorgeous scarlet and yellow flowers to the sun nearly the whole year through. There is a variety with yellow flowers. The plants should be headed back and fertilized after their periods of blooming. C. nuga is a thorny, half climbing shrub which promises well.

Catesbæa spinosa is an elegant shrub from the Bahamas. It has small, thick, shining leaves, is quite spiny, and bears numbers of pendant, trumpet shaped, lemon yellow flowers. These are cut into four segments on the border and are from four to six inches in length. It does well in ordinary pine land.

Cestrum. C. nocturnum is the Night Blooming Jessamine. The flowers are small and greenish white but give out, at night only, the most powerful perfume. A large bush will scent an acre of garden on a calm night. There are those who complain of these strong odors as being overpowering but they are never so to me. I love when out walking at night to plunge my head in the very middle of these bushes and revel in the wealth of their fragrance. C. diurnum is a very fragrant day bloomer. C. elegans and aurantiacum have failed with me, probably on account of root knot.

Clerodendron squamatum has large soft, cordate leaves and brilliant scar-

let flowers. C. fragrans with double white flowers has been naturalized here. C. siphonanthus, with long tubed, dirty white flowers and showy berries has also escaped cultivation. C. thompsonæ is either a shrub or half vine and has elegant flowers with white calyx and a deep red corolla. All flourish here.

Codiaeum. The Crotons. Perhaps the finest ornamental leaved plants we grow. The climate here is a little too cold at times in winter for them to do their best and the soil is generally rather poor for them. However, if planted where they are protected and heavily fertilized they make a glorious show. A large variety is grown in Dade County but the names are in great confusion. They are hybrids, from two or three species belonging in the South Seas and have a great diversity in the forms of the leaves and coloring. Every one should plant Crotons.

Dombeya wallachi, is a wonderfully vigorous, rapid grower with immense, soft leaves measuring a foot or more in length and width. The flowers begin to open in late winter and the plant continues to bloom for a long time. They are in very large heads, a handsome pink, and remind one of those of the Hydrangeas. A poor stub of a plant put out in the pine land without fertilizer last fall bloomed superbly and is now six feet high and as much across.

Duranta plumieri is a rampant grower and bears spikes of blue flowers looking like magnified forget-me-nots. During the winter when it is in bloom swarms of butterflies of many colors hover around it and contribute not a little to its beauty.

Euphorbia splendens is a fine old thorny, succulent plant with pretty red bracts. E. sanguinea. I have received a plant bearing this name from Reasoner Bros. which has ovate leaves of an indescribably rich, bronzy purple crimson with lighter veins. It is an exquisite plant, half shrubby and grows well but is very tender. E. pulcherrima, commonly known as Poinsettia pulcherrima is one of the finest ornaments of our gardens. It begins to develop its dazzling crimson bracts in November or sometimes in October and often holds them until in March. As soon as the new growth starts in the spring the stems should be severely cut back and these may be cut up and planted to within one bud in the ground to make new plants. As the old plants grow through the summer it is well to pinch out the tops to make them branch. They should be well fertilized, for with the best care they are usually rather short lived here.

Eugenia microphylla. An exquisitely beautiful shrub with dark green, linear leaves. It makes repeated growths through the year and the young leaves are yellowish or brownish pale green, a charming contrast with the old ones. It promises to succeed here but I think it will do best when it is partly shaded.

Hibiscus. The two first ornamental plants that the settler here puts out are Coconut palms and Chinese Hibis-

cus. These, from their beauty and their adaptability are planted wherever civilized or semi-civilized man is found within the tropics. There are a dozen or more varieties here in cultivation and all do exceptionally well. Put a cutting into the ground and within a year it is flaunting its glorious blossoms to the Florida sun. When the plants become old and scraggy all that is necessary to do is to cut them severely back just before growth starts and in a little while they are a mass of fine new growth and foliage. I have plants eight years old so cut back which have never had any fertilizer, that are the picture of health and vigor. H. mutabilis, with soft, velvety, angled leaves and large pink flowers that open in the morning and turn dark through the day, is very fine. The same cutting back process is almost necessary with this, in fact I practice it with Oleanders and a great variety of things that become old and lose their vigor.

Ixora. One of the finest genera of shrubs that can be cultivated in this region, though they are tender and need protection when young. I. coccinea, scarlet; I. colei, white; I. ambona, orange, and there are yellow and pink varieties. They should be in every garden.

Hydrangeas. These have utterly failed with me and I presume that our soil is not suitable.

Jasminum. The genus contains a considerable number of species, most of which do well here. J. sambac, the Arabian Jessamine and its varieties, J. pubescens, and J. simplicifolium have white flowers. J. primulinum is a vigorous grower and has large yellow flowers. These do better with me than any others. Most of them may be grown as shrubs or sprawlers.

Lagerstrœmia, L. indica, the well known crape myrtle is quite common here, but it does not do so well as it does further north. There are white, purple, pink and light red varieties.

Malvaviscus arboreus, an old fashioned shrub with upright, Abutilon-like scarlet flowers. It will do fairly well with good soil and plenty of fertilizer.

Nerium, or Oleander. The oleanders are among the best ornaments of our gardens, being hardy, generally healthy and floriferous. They bear crops of their handsome flowers several times a year and some flowers may be picked at any time. There is a considerable variety of colors from white to pink, cherry red, rich crimson and purplish, and there are yellowish flowered varieties though as yet no clear yellow. They succeed equally well in pine, hammock and muck land.

Nipa fruticans. The Thatch Palm of the East Indies. Sprouted seeds of this plant have been sent to me from the Bureau of Agriculture at Manila which I have planted in my brackish swamp and they are doing finely. It is not a true palm but is related to Pandanus according to Lindley and others and its systematic position is in doubt. It is a beautiful object and it is probable that it will do well in our salt marshes.

Panax. Ornamental leaved plants, among which we have P. excelsum; P. plumatum; P. aureum and P. victoriæ, the two last with variegated leaves. They are very tender and should be sheltered.

Phyllanthus nivosus roseo-pictus. A lovely, small, delicate shrub which has beautifully variegated leaves, green, brown, white and pink. It is used sometimes for hedges here. P. atropurpureus, of which I have a fine specimen has dark purplish leaves and is much more vigorous than the former.

Pittosporum. Hardy shrubs with glossy, handsome leaves which bear small, fragrant flowers. P. tobira and a variegated variety, P. viridiflorum and P. undulatum do finely here and soon make large shrubs, but so far have not bloomed for me.

Plumbago. Leadworts. P. capensis, blue, and a white variety and P. rosea, do well. P. larpentæ has not succeeded with me.

Raphiolepis indica and R. japonica, two hardy, neat shrubs with obovate, glossy leaves and pretty white flowers, produced almost continuously, are desirable and do well here.

Ricinus. The Castor Bean. R. communis has become naturalized here around dwellings, as well as the smaller variety or species, R. sanguineus, with all the parts deep purple red. They are striking, short lived plants.

Rosa. The Rose. Although in many places this is the acknowledged Queen of Flowers, it is hardly so here. All the species do best in a strong, tenacious soil and ours is too light and poor to suit them. They do better in the hammock land, and if abundantly fertilized with bone meal and well watered some of them will succeed for a while. They will probably do better in the Homestead region of Dade County than elsewhere in it.

Solandra grandiflora is a sprawling, rapid growing shrub or half climber that bears immense, tubular, yellow flowers. It grows finely and blooms profusely in our pine land.

Tabernæmontana coronaria is a superb large shrub or small tree with leathery, very glossy leaves and large, waxy white, semi-double flowers which are fragrant at certain hours of the day. It blooms abundantly throughout a large part of the year and is completely at home in Dade County.

Tecoma stans. This lovely shrub, or in some cases a small tree, is a native of Mexico and the West Indies, but is becoming naturalized in Dade County, Florida. It is an upright grower with airy, pinnate foliage and enormous clusters of large, fragrant, golden flowers. It is a poor man's plant and will grow anywhere, springing up spontaneously in and around gardens and dwellings and requiring no care.

Thunbergia erecta. A moderate sized shrub with large curved, violet-blue, trumpet-like flowers having a yellow throat. It must be grown in a more or less shaded location and if so planted will flourish and bear quantities of its lovely flowers with little

attention, though it responds to good treatment. There is a white flowered variety which is not so fine.

Viburuum tinus. A fine, old-fashioned evergreen shrub bearing pretty white flowers and known as Laurustinus. It is perfectly hardy and promises well here.

EXOTIC ORNAMENTAL VINES AND CREEPERS

Abrus precatorius, Crab's Eye Vine, A lofty climbing vine with delicate pinnate leaves and small pods of round red seeds, each with a black eye and called "Crab's Eyes." The whole plant has a decided taste of licorice. It is distributed all over the tropics and according to Tenson-Woods it grows near the mangroves in Malaysia. It soon spreads rapidly when introduced on a place here.

Agdestis clematidea is a rapid growing vine with soft, cordate leaves and large panicles of lovely, small, waxy white flowers. It grows from great ill scented tubers, in some cases larger than a bushel basket. When once the roots are well grown it soon covers a large area.

Allamanda hendersoni is a magnificent sprawler, with glossy leaves and very large, trumpet-shaped, golden flowers. It is often used to cover piazzas here, though it is sometimes grown as a shrub. The tubes of the large flowers are favorite resorts of the tree frogs from whence they cheer the heart of the nature lover with their delightful music. I have A. schottii which is doing well, but has not bloomed yet.

Antigonon leptopus. Mountain rose. A lovely vine from Mexico with airy racemes of the most brilliant rose colored flowers, blooming almost the entire year. It stands neglect well.

Argyreia tiliæfolia is a rampant climber with very large, handsome, cordate leaves and white and violet flowers that is related to the morning glory. A fine specimen is growing in the grounds of Dr. John Gifford at Cocoaunt Grove.

Aristolochia, Birthwort. A. elegans is sometimes cultivated here for its large purple and white blotched, very curious flowers.

Asparagus plumosus is well known at the north and does well here planted in a sheltered place.

Bignonia venusta is, perhaps, the handsomest vine planted in South Florida. It has trifoliate, glabrous leaves and immense clusters of the most vivid orange scarlet, long, tubular blossoms, produced in astonishing abundance in late winter and early spring. The drooping corollas continually loosen at the base and slide down the long bright pistils and for a time hang there suspended, thus adding another element of beauty to these superb flowers. There is a wonderfully fine vine covering some 60 feet of piazza at the house of Mrs. Fuller, in Cocoanut Grove, and when this is in bloom there are spaces of many square yards where nothing but masses of its lovely flowers are seen. B. crucigera, Cross Vine, is a native of northern

Florida, with dull red flowers. B. chamberlaynii has yellow flowers. The vines attach themselves by means of hooked tendrils.

Bougainvillea spectabilis is a thorny vine with the most dazzling purple bracts and when it does well is one of the showiest of our winter bloomers. A leaf rolling caterpillar sometimes eats the young growth so badly that the vine is a failure. B. lateritia has large leaves and very showy brick red flowers but is very difficult to propagate. I have a very fine vine of it.

Cereus. A few species do well here. C. nycticalus and C. grandiflorus sprawl around the bases of trees, sometimes climbing by air roots and bloom beautifully here in spring or early summer. C. triangularis has become naturalized at the Punch Bowl, south of Miami. I have seen a specimen clambering over a live oak at the residence of Mr. John Soar, at Little River, with over 50 flowers open, each averaging a foot or more across. Several other climbing species promise well here.

Cryptostegia grandiflora is a rampant vine with glossy leaves and handsome, purplish, bell-shaped, starry flowers a couple of inches across. C. madagascariensis has red veined leaves but has not yet bloomed for me. Both produce rubber.

Dioscorea alata and one or two other species, the yams of the tropics, are rapid growers during the warm season, but die down in late winter. They have strikingly handsome, large leaves and interesting, triangular, winged seed.

Entada scandens. The great brown, flattened seeds of this West Indian vine are often washed up on our shores and I have planted many of them. They sometimes germinate and even grow to a height of 20 feet but for some reason die, yet I hope sometime to succeed with it. The vine has delicate, bipinnate leaves and climbs by means of tendrils. Its enormous, twisted pods are from six to eight feet long.

Euonymus radicans has completely failed with me though I have often tried it in various situations.

Gelsemium sempervirens, Carolina Jessamine, is a native of North Florida but probably does not grow wild in Dade County. It is sparingly cultivated here but does not always do well.

Gloriosa superba and virescens, two lovely vines bearing flowers variegated red and yellow, resembling lilies, are cultivated here occasionally, but they do not succeed very well with me.

Hoya carnosa, the well known wax plant, is doing well in my slat house, but has not, so far, succeeded well out of doors.

Ipomoea, or Morning Glory. An immense genus, several species of which do well here. I. tuberosa has fine, glossy, palmate leaves and bright golden flowers in winter that look as though they were varnished. I. sidifolia forms immense, knotted, ribbed stems, running to a great distance and bearing in large clusters, unnumbered rather small, white flowers with a greenish center. They are much sought for by bees. It blooms about

Christmas and is called Christmas Vine. I have one which covers an extensive chicken yard fence and house and a quarter of an acre of ground and I have estimated that a million flowers opened on this vine every day for six weeks.

I. horsfalliæ has lobed leaves and elegant deep crimson, glossy flowers, perhaps the finest of all. A beautiful vine of this covers a pergola at Dr. John Gifford's place in Cocoanut Grove. A number of other species do well here.

Lonicera or honeysuckle. L. japonica is cultivated here and does fairly well.

Monstera deliciosa. A remarkable vine making a very strong growth and having colossal leaves, lacinated at the edges and full of natural holes It attaches itself to trees or cliffs by aerial roots and sends down feed roots from great elevations. The plant is an Aroid and its great white spathe is cream colored, boat shaped, and almost as thick as one's hand. Charles Kingley states that when it is opening a heat is generated sufficient to sensibly affect the thermometer. This is true of the flowers of Victoria. The fruit is elongated and cone-like and ripens 18 months after the flower blooms. I have a grand specimen planted in my hammock which climbs a mastic tree and is now over 20 feet high and sometimes has one crop of fruit on it and sometimes two. It is the Ceriman of the West Indies.

Mucuna urens. The large seeds of this West Indian vine are often washed up on our shores and many of them will germinate and grow, though the plants have never become established in a wild state in Florida, so far as I know. I have repeatedly planted the seeds and had vines get up to 20 or 30 feet and for some reason they have died. At last I have several vines that, together, run over a half acre of the hammock. It has trifoliate leaves and large clusters of strange and handsome, pendant, yellow flowers in winter and spring. These are followed by pods more or less covered with stinging hairs. When ripe the seed is an inch in diameter, brownish with a distinct border. The stems of these vines, knotted and twisted together, are now as large as my thigh.

Passiflora. Several species of passion flowers have been tried here but they do not seem to do well and die in a short time.

Pereskia. A climbing, leafy cactus of which we have two species. P. aculeata and P. bleo. Both have pink flowers but those of the latter are finer, looking something like those of a single rose.

Philodendron. I have several unnamed species of this fine Aroid genus, all of which are climbers and are doing well in the hammock. One which I presume to be P. lacerum has large pinnatifid leaves and is a noble plant.

Petræa. A lovely, half climbing shrub with bluish flowers, very floriferous but quite difficult to propagate. There is a fine specimen in the grounds of the Royal Palm Hotel at Miami.

Pothos. When established in suitable ground P. aureus is a strong

growing vine with very large, cordate thick, shining leaves, splashed and striped with yellow. It is a handsome plant and does best in rather damp rich soil. P. argyreus is a more delicate species marked with white.

Pueraria thunbergiana, a popular vine at the north has never succeeded with me. It is no reason, though, because I cannot succeed with a plant that some one else may not make it do well and it has several times happened that after repeated failures I have at last been completely successful.

Tecoma. T. capensis is a sprawler with pretty, deep green, pinnate leaves and heads of brilliant scarlet, trumpet like flowers. When it is once established it spreads rapidly over the ground and throws out roots at every joint. It is perfectly at home here and may either be trained up a piazza or allowed to form a mass.

Solanum. Two species are very fine vines with pinnatifid leaves and light blue flowers. In S. seaforthianum the individual flowers are rather small; in S. wendlandii they are sometimes two inches across and lighter colored. The berries of S. seaforthianum are brilliant red and handsome and are much relished by the mocking birds. One of these vines grows on my north piazza and daily a mocking bird comes for his feed of berries, having little fear of the inmates of the house.

Stephanotis floribunda. An old hothouse favorite at the north. I have one planted in the edge of the hammock which has run up a tall live oak where it opens each summer its lovely white, waxy, fragrant flowers.

Thunbergia alata. A pretty, small, herbaceous vine with bright cheerful looking flowers, white, buff and deep yellow, and each of these has a form with a dark eye. Along the edge of my hammock in a spot sheltered with other growth I planted seeds of these and now they run all over every shrub and tree and on the ground and make the place gay with their thousands of blossoms. This is "Thunbergia Nook." T. fragrans is something like T. alata but the leaves are heavier and the flowers larger and of finer substance, pure white. I have not been able to succeed with T. laurifolia or T. grandiflora.

Trachelospermum jasminoides. This beautiful vine with its airy clusters of starry white, fragrant flowers is a general favorite, even with rabbits, for they have repeatedly eaten it to the ground for me. It is commonly called the Confederate Jessamine and is one of the best plants we grow.

Vallaris dichotoma. A beautiful climber with dark rich foliage and white flowers. I have a fine specimen in the edge of my hammock.

Zebrina pendula. This is the old, well-known Tradescantia zebrina, with its pretty purple and silvery striped leaves, everywhere grown in the north as a basket plant. It would do very finely here in moist land and partial shade if the land crabs would let it alone but they tear it to pieces in summer more than it grows the rest of the year.

EXOTIC HERBACEOUS ORNAMENTALS

It is hard to draw the line between herbaceous plants and shrubs, or even between them and trees. I have placed the banana and traveler's tree here, though they may have tree like proportions, because they are succulent and do not branch.

Acalypha. The Acalyphas are among our most gorgeous garden ornamentals. When full grown the red leaved species look like sheets of flame on the landscape, but the descriptions in the cyclopedias are so vague as to be absolutely worthless for purposes of identification. We have a form with large, dark, bronzy red leaves, variegated, often to half the leaf, with carmine. A second form has smaller, narrower leaves, the ground color lighter than in the first, and is more greenish, the light color being carmine. A third form has much the same colors as the second but the leaf is more coarsely serrate and is often contorted. A. marginata has green leaves margined with white, the green turning to deep red bronze in winter, the white to pink or red. A. miltoniana is an elegant form with narrow, often curled, cut leaves and there is a fine sport from it with broader leaves, the borders margined and blotched with yellow. All these do well here, the A. marginata being the strongest grower and the hardiest. A. godseffiana, beautifully margined white and pink, has not done well with me. A. sanderi has long cat-tail-like, brilliant red flower spikes, but is quite tender. Achyranthes and Alternantheras, richly colored plants have not succeeded with me.

Aechmea. Choice epiphytic plants which do well when fastened on to trees in the hammock. A. discolor has broad leaves, deep green above and rich purple below, with coral red calyxes and deep blue corollas.

Alocasia. Several species of this Aroid genus are fine, but there is great confusion as to systematic position. A. macrorhiza and its variegated variety are often cultivated. A. rœzeli has handsome green leaves spotted whitish.

Agave. I have about 25 species of this fine genus and all are doing well or promise to. A. americana, variegated variety is especially fine, so is A. salmonea and A. recurvata. A. victoria reginæ is a little gem. These plants once established soon propagate themselves by underground suckers, and when they bloom, by bulblets. I have a plant of an unnamed species with a spread of 13 feet and a height of nearly 11, which shows no signs of blossoming. Plants bloom here sometimes within three or four years after planting.

Alpinia nutans, Shell Flower. A handsome, rank growing, canna-like plant, with curious and elegant flowers which does best in rich, rather moist soil.

Annuals of several kinds do well here in the cooler part of the year and especially if watered. Phlox drummondii, Petunias, Portulaca, Iberis or Candytuft and Marigolds make the garden gay in winter and spring.

Anthurium. I have not succeeded well with most of the species offered in the catalogues. A. huegelii, a stately plant with immense, oblong leaves, which I have introduced from the limestone mountains of Cuba, grows finely here and will be an excellent plant for rockeries.

Asparagus sprengeri is used a good deal for vases and does well.

Bambusa, Bamboos. A number of species do finely here. Among them B. argentea and a striped variety form immense plants 35 to 40 feet high and do well on high or low ground. B. disticha is a rather dwarf species reaching 10 feet high with handsome foliage. B. spinosa is very thorny and is a large species from the East Indies. B. vulgaris grows to 60 feet here and does well anywhere but especially on low land. B. verticillata is a handsome species with striped stems, forming immense clumps. All these are doing well. B. arundinacea and Arundinaria metake have not yet done well with me, neither have Phyllostachys aurea or violescens. Dendrocalamus strictus will probably succeed. The common Cyperus alternifolius, Umbrella Grass, is rarely found growing wild here and it does well in moist places.

Begonia heracleifolia is a rank growing species with large, sharply lobed, hirsute leaves and panicles of pink flowers, and is fine for rockeries where not too dry. My experience with the other species is that they are uncertain.

Bryophyllum calycinum is a succulent with opposite leaves and clusters of attractive green and brown flowers. It is useful for rock work.

Cactus. Several species have already been mentioned. I have tried many species of Cereus and Opuntia that do indifferently well or fail. Melocactus has been brought from the Bahamas but does not live long. I have been rather successful with Phyllocacti planted on the trees, and species of Rhipsalis do well as epiphytes.

Caladium. The fancy leaved Caladiums do quite well under a slat house but have not succeeded with me out of doors.

Cannas do well in moist, rich, earth, but have failed with me on pine land.

Coleus. These gorgeous plants would do well here but for the root knot, caused by a villianous little nematode worm in their roots, changing them into great knots, after which the plant dies. This root knot is a terrible pest here and it attacks and destroys a great variety of small plants. Whenever a little plant looks sickly it is well to dig it up, and, if not too far gone cut the roots back to where they are healthy and reset in a new place. Sometimes valuable plants may be saved in this way.

Crinum. Beautiful amaryllidaceous plants with pink, white and reddish, large flowers. I think they should have rather rich, damp soil as I have only had indifferent success with them on high pine land.

Curcuma. These do well on moist, rich soil and have very attractive heads of curious flowers but I have failed with them on high land.

Dasylirion serratifolium, a Yucca-like plant with the ends of the leaves always looking as if dead, has a tall panicle of white flowers. It does well in dry land but with me is a slow grower. Would look well on rockeries.

Dieffenbachia. Beautiful, broad leaved plants which in most species are finely variegated, but so tender here that I have no success with them in winter even in the slat house.

Dracaena lindeni. I have a fine plant of this in my hammock. All the other species I have tried soon fail. D. godseffiana may succeed planted in a half shaded place.

Eranthemum pulchellum grows rankly in pine land and bears quantities of lovely blue flowers all winter. It should have a place in every garden here. E. atrosanguineum, with handsome, very dark, purplish leaves, would do well but is excessively tender. E. albo-marginatum is a beautiful plant but seems quite tender.

Fittonia argyroneura and F. verschaffeltii are lovely little trailers, the leaves of the former netted with silver, of the latter with coppery red. They need shade and moisture but are very tender.

Ferns. Many of the species can be grown in slat houses but I have had poor success with most of them when planted out. I have a deep artificial pool in the hammock and on its rocky sides I have planted many ferns and Selaginellas. The native species mostly live; nearly all of the exotic ones die sooner or later.

Furcræa. I have a dozen species of these fine, stately plants and all grow in the poorest land without fertilizer. They closely resemble the Agaves but generally do not have such sharp thorns, and the flowers are more ornamental. F. lindeni is a magnificent plant with striped leaves. The descriptions in the encyclopedias are so imperfect that I am unable to identify most of my plants. With the Agaves they are most strikingly tropical looking ornaments of the garden and they all do well here.

Gynura aurantiaca, Velvet Plant. Quite an attractive plant with velvety, purplish leaves and orange, tassel-like flowers. Planted anywhere it will flourish, but does best in shade.

Hedychium coronarium, Garland Flower, belonging to the ginger family, is a handsome plant with attractive white, fragrant blossoms and does best on damp rich soil.

Heliconia. Several species of noble, tropical plants with exceedingly odd handsome flowers, but none have done well for me.

Hippeastrum. Commonly known as Amaryllis. Beautiful bulbous plants of numerous species which do fairly well here. H. reginæ has large, red, showy flowers with a greenish center. H. johnsoni has deep red flowers with a white stripe in the center of each petal. H. equestre is an old, well known plant with flowers somewhat like those of H. reginæ. I have never succeeded with H. aulica. The lubber grasshopper is the sworn enemy of the Hippeastrums and Crinums and

many a beautiful plant falls a victim to its voracity. In early spring I watch for the young which remain together when hatched, often 50 or more in a lot, and I kill every one at that time. By doing this I prevent infinite damage later. Prof. Henry Nehrling, of Gotha, Fla., a veteran horticulturist, has originated a marvelously fine strain of hybrid Hippeastrums.

Iris. Some of the members of this lovely genus do well here in low, rich ground. At Cocoanut Grove along "The Trail" one of the species has become naturalized in the edge of the brackish swamp. I have plants of I. germanica, the German, and I. kaempferi, the Japanese Iris, growing and promising well.

Jacobinia coccinea is one of our standard herbaceous plants and is quite common in this vicinity. It grows and does well in sandy pine land and flaunts its gay spikes of scarlet, tubular, varnished flowers nearly all the year.

Lantana. Coarse, rough plants, but always covered with their bright heads of flowers, white, lilac, yellow and orange being the prevailing tints. They do well here when not troubled with root knot and are improved by being fertilized.

Leonotis leonurus. One of the very best herbaceous plants for this region. It will take care of itself when once it is established, sending up rank growths which carry whorls of orange, tubular flowers.

Musa. Some of the ornamental musas have succeeded with me and others have failed. M. rhodochlamys, from Congo, is a glorious species, very vigorous and healthy, with rather upright leaves and handsome bloom. M. martini and M. gillettii are fine. M. rosacea is a pretty plant and these have sometimes succeeded. I have had poor success with M. ensete, the great Abyssinian species, and several others.

Pandanus. Quite a number of species belong here which might be called shrubs or small trees as well as herbaceous plants. P. veitchii is a favorite at the north, and is a noble plant here, forming great clumps 10 to 12 feet across and considerably higher, but it loses much of its color when planted out. P. sanderi grows fully as large as veitchii but retains at all seasons its marvelous coloring. P. candelabrum, the striped variety, is a fine plant but loses some of its color in the open. I have a fine group of these three in a sheltered, partly shaded place and as a mass of splendid tropical color and growth I have never seen it equalled. P. baptistii is beautifully striped and holds its color well; it is entirely free from spines. I have a mass of this that is 20 feet across and 12 feet high, that has been plnated about five years. P. luzonicus and P. odoratissimus promise well. P. graminifolius is a delicate species which stands on stilted roots and P. pacificus is a beautiful, broad leaved species, but unfortunately both are excessively tender, even a chill injuring them. None of these pine land.

Pedilanthus tithymaloides is a succulent plant with curious red flowers

shaped a little like a human foot. It is beginning to be naturalized.

Pelargonium. The Horseshoe Geraniums do not succeed here when planted out, as a general thing, though they are sometimes grown in pots. The scented Pelargoniums do very well for a while if fertilized.

Ravenala. Two species of noble plants though R. madagascarimsis is commonly called "Travelers' Tree." It forms a trunk though it does not branch, and has distichous leaves. It does fairly well on pine land but flourishes best in rich, damp soil. I have a specimen about six years planted which is placed in such a situation and it is the finest I have seen. It is 25 feet high and is just beginning to form a trunk which is four feet and 11 inches in circumference at the ground. It has 17 leaves with a spread of 29 feet, their stems being about 10 feet long and the blades 3 feet wide and 9 feet or more in length. The flattened leaf stems where they join the trunk are as large as a man's arm; at the blades about the size of his wrist. It has not bloomed yet. It is easily the most striking plant on the place. R. guyanensis has not done well with me.

Richardia, the well known Calla Lily, is only a partial success here.

Russelia juncea, a slender, twiggy stemmed plant, bearing quantities of coral red, tubular flowers, is beginning to be naturalized here. It is a Mexican plant and is perfectly adapted to our poor soil and is always in blossom. A variety lemoinei is more floriferous than the type.

Sansevieria zeylanica, a striking, variegated plant, takes absolute possession of the soil to the exclusion of almost everything else wherever planted. I have two other species.

Strobilanthus dyerianus is a handsome plant variegated with iridescent tints of purple and bronze. It has never done well for me, but perhaps it might succeed in rich, damp soil, partly shaded, where it would not be troubled by land crabs.

Strelitzia. Magnificent plants with the leaves distichously placed, bearing peculiar, very handsome blossoms called sometimes Bird of Paradise Flowers. I have S. reginae, a small species, and S. augusta, which reaches a height of 18 feet.

Tillandsias and Vriesias all do well here fastened firmly to trees in the hammock. V. splendens is a lovely plant, its leaves barred across with brown. Cryptanthus zonatus is a beautiful epiphyte, also barred.

Tradescantia discolor is a fine plant with deep purple under surfaces of the leaves that will do well here almost anywhere. It is a good plant for rock work, as is its near relative, Zebrina pendula.

Vinca rosea. Commonly called Madagascar periwinkle. Wherever man goes in South Florida this plant goes also. There is a purple, a pure white and a variety with a red eye. The white variety is the most vigorous and floriferous and works up beautifully in boquets. If given a little extra care in the way of fertilizing the growth will be finer and the flowers larger.

Xanthosoma violaceum. A grand plant with immense arrow head leaves tinted bluish or violet, which is often grown around houses. It should have plenty of fertilizer to make it do its best, and it likes moisture.

ORCHIDS

I must devote a few words to these strange, lovely and interesting plants before I close this list. I have about 70 species of epiphytal and sub-epiphytal orchids in my hammock. A few of them are native, the rest of them I have planted on the trees and this may be successfully done by anyone who has hammock. The plant is placed in proper position on a tree and pieces of shingle or thin board are nailed with one end on the tree and the other pressing the roots to the tree. It is absolutely essential that the plants be firmly placed, for if they can be moved about they will not become established. I often put a little sphagnum around the roots and water occasionally until they are established. I have bloom from time to time throughout the year, and when they are all established I shall have a constant succession of flowers. The Cattleyas stands at the head of these, both because they are so much at home and for their superb blossoms. The Laelias are almost equally fine. The Dendrobiums generally do well and so do the Epidendrums. Schomburgkia tibicina, the Vandas, Oncidiums, Zygopetalums, Miltonias and some others do well. I doubt if the Odontoglossums succeed. I have not tried Phalanopsis.

The above list of ornamental plants of Dade county is nowhere near complete. There are no doubt, many things cultivated by others that I have not seen which should be included and there are hundreds of species that I have, or have had, that I have not listed, partly because to do so would extend this paper beyond reasonable limits, and in part on account of not having had many of them long enough to form any idea of what they will do. I have growing now, or have had, everything in the above list, with perhaps a dozen exceptions. Many will succeed when other trials with them have been made. It was a long time before success was reached by floriculturists in the north with the Victoria regia, and for a time it was believed it could not be made to grow under glass, but now it and other species are common. A few things, probably, which now promise well, will fail for various reasons. But we can have no conception of the immense variety of species from the warmer parts of the world that will flourish in this favored land. If treated right this poor soil becomes better and better as the years go by, fitted for a greater variety of plant life. When one begins, it is in some cases sour, and cultivation sweetens it. Roots decay and add to its fertility. I never destroy an atom of anything that grows with me, weeds, grass, leaves, broken limbs, are all used as mulch and to make humus, the crying need of the soil. And as one's trees and shrubs become grown they shade the ground and afford protec-

tion in a marked degree from the sun, frosts and hurricanes.

No attempt has been made in this paper to bring the nomenclature down to date or to adopt any system used by anybody. It was prepared in the greatest possible haste on account of lack of time to properly handle the subject. I have simply given a name that has at some time been applied to each plant discussed.

With regard to propagation I could not give detailed instruction without extending this paper beyond reasonable limits. A large number of our cultivated plants raise fertile seeds which can be easily grown. Many may be propagated from suckers or layers, the Ficus can be air-layered, that is in the rainy season, a cut may be made in the limb, which is kept open by a bit of wood. Sphagnum moss is wrapped around the wound and the whole is tied up with twine and wetted occasionally. Most soft-wooded species can be rooted from cuttings, though these will not root so readily from plants in the open as from those growing in pots. If one has much propagating to do he should build a slat house with tight, low walls and roof strips so laid that they will cover about two-thirds of the space. Either on raised benches or the ground he can sow seed and root cuttings. Hardy seeds can be sown and cuttings can be rooted in the cool part of the year, those of tender plants should be put in in the spring or summer. It is well to have a pit covered with glass which can be shut tight on cold nights, where one can preserve the very tender things. Even a small frame covered with glazed sash is a great help in propagating.

I make claim to no skill whatever as a propagator or grower of plants. There are those who succeed where I fail, who seem to have a genius for making things grow. But after all, as Peter Henderson has said, eternal vigilance counts for more in growing plants than any skill. I can only claim for myself the deep, devoted love for them such as a mother has for her little child. Looking over my grounds I feel that the dream of my life has come true, that the reality is far grander, more beautiful and satisfying than I thought it ever could be. It is a source of the greatest pleasure to me to wander among these dear things to watch the dormant buds breaking, to find some rare and cherished flower opening at last. I feel that I am a part and parcel of it all as I walk in my garden with a sense of reverence and devotion.

I love to wander in my grounds at night; the trees seem larger than in the glowing sunlight. I love to look upward where their tops make a blot of darkness against the lighter sky. I love to walk in the hammock at night even when it is darkest. But it is most beautiful when the moon overhead pours down its light through the epiphyte-laden trees like a sheet of illuminated spray from some waterfall. I cannot close this paper more fittingly than by quoting the words of Charles Kingsley, in his Christmas in

the West Indies: "But how beautiful they are all and each after their kinds! What joy for a man to stand at his door and simply look at them growing, leafing, blossoming, fruiting, without pause, throughout the perpetual summer, in his little Garden of the Hesperides, where, as in those of the Phoenicians of old, 'pear grows ripe on pear and fig on fig' for ever and for ever."

ORNAMENTALS AT PUNTA GORDA

Mrs. Marian A. McAdow

Mr. President, Ladies and Gentlemen:

In preparing this paper on ornamental horticulture I have endeavored to keep in view the fact of what our necessities and peculiar environment are and I shall try to make my knowledge, gained by thirteen years' experience in growing the tropical plants that best adapt themselves to the conditions that exist in this semi-tropical part of our country assist some of my hearers who may have a desire to beautify their surroundings by planting such trees and shrubbery as will best conform themselves to the soil and climate of their particular locality. I shall use common names for plants so far as I can, as they are more easily remembered than are the botanical terms and any nurseryman to whom you may apply knows the common names as well as the Latin ones for the plants and trees I shall name.

My experience in growing tropical plants has all been acquired in Punta Gorda, which is 85 miles farther north on the Gulf Coast than Miami is on the Atlantic Coast. The grounds of my home extend 400 feet along the waters of Charlotte Harbor, an arm of the Gulf that extends 30 miles up into the land. For 200 feet of this strip we filled in a plat extending 85 feet into the waters of the Bay. Our tides raise the water from 1 to 3 feet and on three occasions an unusually high tide has covered this filled-in plat and it may interest you to know that this salt bath never killed or injured any of the 40 or 50 varieties of trees and plants growing thereon, with the exception of a bed of ornamental-leaved Strobilanthes; in fact it rather acted as an invigorating tonic. These three flood-tides occurred in summer, however, when the rains had freshened the waters of the Bay considerably, or I might have another story to tell. This filled-in ground is about one foot higher than the average high tide and rarely dries out as does the upper terrace which is about two feet higher. The original filling and soil of the terrace was common white sea-sand. It has been enriched with dead leaves, barnyard and commercial fertilizers to produce results that may be duplicated by any one who has the am-

bition to do it, if your winter temperature is not too low. The coldest temperature I have known on my grounds was 28 degrees above zero and it remained at that for many hours. We have white frosts every winter. The highest temperature ever registered on my northern veranda was 92 degrees. I won't pretend to make the statement of what a thermometer might have registered in the sunshine at that time.

From the above statements you can make comparison with your own soil and climate conditions and arrive at a fair estimate of the results you may expect in your environment with a limited amount of time and attention given to certain little details that go to insure success. I have water under pressure from an artesian well of our own that is 120 feet deep and from the city well which is 482 feet deep and has enough salt in it to be distinctly noticeable to the taste. I often flood the ground with this salty water without hurting the plants. Our grounds are badly infested with cricket-moles and this spring I noticed the Grackles and Starlings wading around in the water busily engaged in picking up many large bugs and despatching them in a quick and business-like manner.

Taking my binoculars I soon discovered that these large bugs were cricket-moles. Since this discovery, I have given the birds a chance to prove their good offices every day until they depart for the Northland. Two items that want to be put down as having special importance are these: more plants are lost in the rainy season by being allowed to dry out than by lack of moisture in the winter time. We often have from a week to ten days in the summer-time when no rain falls. With the fierce sun beating down on young plants that have shallow roots, the plant soon suffers for moisture and succumbs if it is not cared for. The second item refers to nourishment. The best insurance one can have, in a general way, is to nourish all trees and plants well in the growing season. In the Fall I harden this growth by feeding some pure sulphate of potash.

I always water my plants *some* during the dormant season. Nature may supply them with a sufficiency but when a whole winter goes by without a drop of rain falling, which occurred the first winter I spent in Florida, you may be sure that young and poorly established plants will suffer for water.

The above remarks cover the conditions that I have had to combat and now we'll get on, to the enchanting things involved.

First and foremost among the finest things we can grow to perfection in Florida, we'll put the Palm family, the type typical of the tropics. If you intend planting but one ornamental tree, let it be a palm. No tree responds to care and interest more grandly than does this species and if you have lived closely enough to Nature to interpret her language, the palm-tree has more interesting and delightful secrets than any tree I know of. The Palmettos are all charming and belong to the southern part of the United States. We are apt to regard them lightly because they are so common to our landscape but if I could not afford to

buy a rare palm I'd go out in the woods and get some of the three or four varieties of Palmetto that grow wild in all parts of our State.

If you live near the water have a few cocoanuts for the sake of the nuts they bear and the interesting study the tree affords, for the Cocoanut tree almost speaks your own language. My trees are 15 years old and have trunks 15 feet high to where the leaves start. They seem to fruit the year round. Some bear better than others and bear different qualities of nuts. Other tall growing palms that are queens of beauty are the Oreodoxa, or Royal Palms. We have a tree 20 years old in the grounds of Hotel Punta Gorda that did not succumb to the freeze of '95 but just how much cold this palm can stand I do not really know. If it were protected while young I imagine it might grow as far north as Sanford and Orlando. Many of the Cocos family are rapid and satisfactory growers. They will stand a low degree of cold if they are protected during frosty weather until they get too high to be easily reached from the ground. I have a Cocos coronata that I have had eleven years, which has a girth of 58 inches and measures 22 feet to its lowest leaves. The Cocoanut trees grew a foot of trunk a year for the time I had them while the coronata grew two feet per year.

Other desirable specimens of this family are plumosa and flexuosa, the pinnae on these two being much finer than coronata.

There are ten or more varieties of this family and any one of them makes a choice addition to a garden. If you have a rockery or a spot where ferns grow rankly an addition of Cocos Weddelliana will add a touch of elegance that makes a wonderful appeal to the eye. It is a dwarf and never takes up more room than an ordinary sword-fern and can easily be covered in cold weather.

Next to Cocos in interest are the Date palms. Of these Phoenix reclinata is more often grown for ornament than other members of the family. This is a palm that is strongly inclined to grow suckers and where these are allowed to grow the plant soon forms a dense clump of dark-green handsome fronds that is extremely ornamental. I have two specimens of this variety in my garden. One in trimmed to four trunks springing from one base, making a most attractive group. The trunks are now about 12 feet high and the leaves have a spread of 35 feet. Drouth and frost seem to have but little bad effect on this variety. I have been told that it grows in parts of California where snow falls. Of this family of palms there are three or four fine varieties other than the one described. Roebelenii is a dwarf with a character quite different from the other members of the family. Next to Phoenix in interest come the Fan palms. Among these are two Neowashingtonias. The first named have tall trunks like the Palmetto and grow rapidly into noble specimens. The two latter are low growing but very ornamental among tall growing species. I have a Latania that is strongly marked with maroon that is going to make a beautiful specimen in two or three

years. A rapid growing tall palm that should have been mentioned in the class with the Cocos palms is the Fish-tail or using its proper name Caryota. In 1906 I had a small plant that froze to the ground. It recovered, however, and today it is 14 feet tall to where its magnificent crown of queerly shaped leaves start. The girth of this tree at the ground is 66 inches. I could write my whole discourse on palms and if it were not that I am expected to make this paper cover a large field I would go on singing the praises of this superb class of plants in the hope that I might enthuse a few of my hearers with my own enthusiasm and thereby get more of them planted in this part of our country where they so well love to grow. If you care for palms and are ever in Tampa you will find there a large specimen of Cycas circinalis that is worth a special trip to see.

Next to palms in scenic effect I place bamboos, but if you haven't a large place where these beautiful plants may have much room to themselves without encroaching on the feeding ground of other plants, don't attempt to do anything with them. They are gross feeders and have no delicacy about infringing on the rights of their neighbors. If you have room for them don't fail to plant Bambusa spinosa. I once had a magnificent clump of this dark-green graceful bamboo but as it grew and spread out I found I would have to sacrifice it or other fine tropical plants. Three quarters of an acre of ground is too small a space for these and bamboos. I have two fine clumps of tall growing canes that will have to be sacrificed for the same reason ere long. For years they have been a fine wind-break for many delicate plants from the cold northers that come sweeping over the Bay in the winter. One point and a most important one is the selection of trees and shrubs that retain leaves during the winter. Many of my richest trees and plants shed their leaves about December. If I had known their habits when I planted them I should have left them out and chosen others that are evergreen. For this very reason palms are more satisfactory than many other tropical trees for they retain their green leaves unless they happen to get badly frozen. The southern Magnolias keep green and down in my part of the State they have a formidable rival in the form of Ficus altissima, a Rubber with a very large, deep-green glossy leaf. My tree is eleven years old and is 40 feet high or more. I have five other varieties of Rubber and they are all desirable. Some of them have been injured by the cold two or three times but I never lost one and their recovery is so quick that the injury is quite repaired in three or four months' time. I have a Ficus pandurata that was just tall enough to have three leaves three years ago and now it is over 20 feet high, even though it was badly injured by the hurricane of 1910. This species is so different in character from other Rubbers that it is a most highly attractive addition to a tropical garden. Its leaves are larger than any other variety I am acquainted with, and their shape, which resembles the body of a guitar, makes them unique in the plant world. While I am on the subject, I wish

to call attention to a native plant or shrub that closely resembles the Rubber. We call it the Sea-grape and it is found almost anywhere along the sea-coast. This is a particular favorite of mine because of its almost round, large leaves with a red petiole, a rare shape among leaves. The new growth is a rich, glossy bronze that is exceedingly beautiful. I have seen this grape trained to one trunk with a spreading top like the umbrella tree; I have seen it growing in a clump covering a space 30 feet in diameter and I have also seen it trained on a wire trellis, making a fine protective screen for a veranda. It has a fruit that makes a most palatable jelly. I donate the fruit on mine to the birds of the neighborhood and it comes in very nicely when other fruits are scarce in birddom. Next to these evergreen trees and shrubs I place the Acalyphas and Crotons. They are both sensitive to frost but I have never yet lost a plant from the cold. I have five varieties of Acalypha and of these I particularly recommend the red leaved ones, as they lend a truly charming variation of color to ones grounds when flowers may be scarce. Crotons are brilliantly colored shrubs of more than ordinary interest because of the remarkable variation in shape and color the leaves on one plant will display. One never tires of studying the richly diversified foliage of these beautiful plants. Fort Myers, Florida, has a soil so rich in humus from hammocks of oak that have contributed their toll to the soil for so many centuries that a more ideal spot could hardly be found for securing fine results with rare tropical trees and shrubs. Some day that little town will be known far and wide for its tropical beauty. In two city blocks, I recently counted, while down there, 40 varieties of common and rare palms. I saw Crotons five or six years old that were eight and ten feet high. A common enough shrub in Florida is Phyllanthus roseopictus which works in well for color effect in a background. I have been told by a California nurseryman that this last named plant and the Acalypha are not grown successfully in that State. They use Achyranthes to get color effect from foliage plants. These do well in Florida but it is very rarely that I see them. A slip broken off and planted most carelessly soon forms a low bush of good dimensions.

Akin to these is Coleus with which pleasing color effects may be obtained. A few members of the Agave and Yucca family lend a touch of individuality to our other tropical shrubs. So far I have confined myself to trees and shrubs that are not grown for the flowers they bear, and it is high time I mentioned a few flowering plants before I am asked to give someone else a chance to say something during the session. For a good old standby in the winter as well as in the summer, I have more faith in the Hibiscus than any other tropical flower that grows in Florida. Its rich, double, red, cerise and shell-pink blooms, as well as the single types are always superb. They lose their leaves on frosty nights but recover in so short a time that one is scarcely aware that they have stopped their perpetual blooming occupation.

Plumbagos, both blue and white, can be depended on for flowers all through the winter if they are well pruned in October. I have now named the most common and dependable tropical plants that give good winter returns as well as summer. If you not want more flowers you will have to draw on those of the North; Cannas, Nasturtiums, Phlox, Zinnias, Asters, Alyssum, Lobelia and the like. If you live in Florida the year around there are many summer-blooming plants that are wonders of beauty. All of the Amaryllis family, if you like the lily. No plant displays more magnificent shades of red than this species. Its white varieties suffused with pink and rose and their delicate odor, are too beautiful for my humble powers to describe. Gladioli, especially the Burbank strains, are a never ceasing wonder during their blossoming season. Caladiums, those interesting members of the lily family with their odd and exquisite coloring, more beautiful to me than a flower, grow with rank luxuriance on the cool, moist shady side of the house. Don't fail to add a night-blooming Jessamine to your garden and any more of the day blooming Jasmines that your garden has room for. Some way or other we associate the perfume of this flower and the song of the mocking-bird with the Southland and you are not living up to Northern ideals of your charming State if you fail in these two items.

Before I close this paper I must say a few words for the rambling shrubs and vines that go farther toward gracing and embellishing the home in Florida than any growing thing outside of palms. Commonest among the ramblers is the Allamanda with its large, pure yellow, lily-like blooms and evergreen, glossy leaves. All the varieties of this shrub are satisfactory. Bouganvilleas make a splendid spectacular effect in purple if you are partial to that color. Fort Myers has some fine specimens trained around the trunks of native Palmettos and they certainly are most effective grown in this way. Quisqualis is a rambling and rank growing shrub which blooms seven or eight months of the year. The flowers are in clusters with long slender tubes finished with a five pointed star that is white when it first opens, changes to pink in a few hours and finally to a rich maroon. All three colors are seen on the plant at one time, giving an odd and curious combination. The perfume of the flower is particularly pleasing, being a blend of the odors of bananas, pineapples, and vannilla if you can imagine such a mixture. If you happen to have some palms with a rough trunk, Pothos makes a fine climber for training up these. The leaves grow to a very large size if well fertilized, and are handsomely blotched with white and yellow. A native Rubber in my grounds is completely wrapped around with a Nephthytis whose leaves are a most odd shape. All the Thunbergias are pretty flowering vines. My favorite among these is a grandiflora that bears large, pale-blue flowers in pairs. Jacquemontia is another blue-flowering vine that blooms all winter instead of summer, making it desirable on this account. Just now the Solanum vines are blooming and will continue to

do so all through the summer. Solanum Wendlandii, with its immense clusters of lavender tinted flowers never fails to draw exclamations of admiration from passers-by. Confederate and yellow Jessamine are always highly appreciated because of their delicate perfume but they are summer bloomers.

If you want three rare and exquisitely beautiful climbers get a Porana, whose blooms resemble the tumbling foam of a cascade; Agdestis whose dainty white flowers resemble the white Persian Lilac of the North, and last of these three gems but most charming of all is Petrea volubilis. The blue flowers of this vine are so different from any that I might compare them with, that I leave this lovely blossom for a grand surprise for you if you should ever be fortunate enough to secure one, for they are very rare and not easy to obtain. The white Clerodendron is another highly appreciated summer bloomer. I have left the Bignonia and Tecoma families until the last, not because they are the least in importance, but because they are the most satisfactory climbers I know of for Florida. Tecoma capensis is never without a brilliant red bloom one day in the year. It makes a fine screen for porches or can be trained to a bush form. Tecoma grandiflora, australis, and jasminoides are each charming. You will find these often listed under the name of Bignonia. There seems to be a deal of confusion among nurserymen in naming these two families and I am never sure of the name that should be given any one of the species. Two years ago I bought a Tecoma reginæ sabæ. It is a very handsome pink, winter-bloomer but came quite untrue to its catalogue description. It is almost identical with Tecoma Mackenii except that it blooms in the winter instead of the summer. A Tecoma Thunbergii that is clambering up the trunk of a Cocoanut tree is a delight all through the summer months. Tecoma radicans is another fine climber for the trunks of trees. A fine winter bloomer is Bignonia venusta with its masses of clear orange-colored, tubular flowers. This rambler blooms two and often three times in the year for us.

Always find a place for a few Moonvines. Their delicate perfume on the night air is one of the fascinating charms of a moonlight night.

If you are not particular about the bareness of branches in the winter-time, a Royal Poinciana, all the Crape Myrtles, and a Jacaranda tree will repay you with a wealth of bloom in the Springtime and the Myrtles bloom from June until November. Poinsettias for Christmas color, are unsurpassed for brilliancy of color, while they last but are rather uninteresting when not in bloom. Bauhinias are exquisite flowering shrubs but look very ragged in the winter. Oleanders are good summer bloomers but it is well to get the kinds that have several flowering periods for some bloom but once and that in April and May.

You have been very kind to listen to this long discourse on a subject that can be of interest to but few, but I am going to impose on your good nature a little longer—just long enough to ask, "Why is it that we have let the little 'Florida

Agriculturist' die?" It rests with us, the people, whether or not we will have an agricultural journal. Don't we need just such a medium of communication for the farmer, the fruit-grower and the trucker of our State? If we need it why don't we have it? I believe this Horticultural Society is big enough to shoulder and foster just such a journal as the "Agriculturist" was for 20 years. I leave it to you, my associates, to develop this idea and make it a reality. You may put down my name for a 20 year subscription.

ORNAMENTALS—MIAMI

Mrs. A. M. Griffing

Mr. President, Ladies and Gentlemen:

I shall endeavor to tell you something of the various ornamentals especially adapted to South Florida.

The one thing that impressed me most when I came down here was the great variety of beautiful foliage plants which grew so easily here and are seldom seen a hundred miles north of our city except as house plants.

First among these comes the croton; no other decorative plant can show such a variety of color in foliage. There are at least thirty varieties of crotons.

Then there are several varieties of acalypha which make such beautiful hedges or individual plants as they can be trimmed any shape desired and grow very rapidly. The bright red acalypha can be grown to some advantage in all parts of Florida, for although the frost kills the tops, they spring up very early making beautiful shrubs in a short time.

Phyllanthus is also a very handsome foliage plant with its dainty leaves of pink and white. The Panax and Aralia are similar, as both have green leaves with white borders. The Aralia has a larger leaf than the Panax.

We also have the famous Poinsettia which is so popular for decoration at Christmas time and it makes beautiful bushes with very little care.

But foliage plants are not all, for do we not have roses in abundance, also oleander and many varieties of Hibiscus in bloom the year round, also many beautiful vines such as the Bougainvillea, Bignonia, Allamanda, Star Jessamine, Clerodendron, Honeysuckle and Antigonon with their blossoms of various descriptions? There is also the Ficus repens, which grows similar to the ivy. Among these vines the Bougainvillea with its rich purple flowers is one of the most handsome and is often trimmed back to make a really rugged bush or tree.

Palms are extensively planted here, the most common of which is the graceful cocoanut. They will grow in any soil,

wet or dry, but thrive best on moist land. Avenues of Royal Palms can be seen here of immense size and the most perfect specimens. Washingtonia palms are being used largely for roadside planting and as they are hardy along the coast as far north as Jacksonville, should be more generally grown as they far outclass the cabbage palmetto and are of more rapid growth. Many other palms are equally as beautiful when grown out doors here, but not so well known, a few such being the Latanias, Kentia, Arecas and dates, as well as the curious looking Traveller's Palm and the Screw Pine or Pandanus utilis.

As to other ornamental trees, there is the Royal Poinciana, which is now in full bloom, the Rubber or Ficus in variety. There is one of these at Perrine with branches spreading one hundred and twenty feet although the tree is only fifteen years old.

The Australian Pine is one of the most useful street shade trees in tropical Florida, as it is of very straight and rapid growth. The Australian Pine also makes one of the prettiest hedges I have seen and in fact can be trimmed any shape desired, and it is said that in their native Australia, they are grown within wire frames and trimmed to different designs including animals as well as geometric forms. In fact the soft lacy foliage of the Australian pine lends itself most readily to the work of the designer.

The Araucaria excelsa or Norfolk Island Pine is a beautiful ornamental tree with its symmetrical branches, which grows very easily and should be planted more generally here.

The tropical almond also makes a beautiful shade tree of symmetrical growth and has the autumn leaves and sheds for just a short time.

Last, but not least, are our beautiful fruit trees which are useful as well as highly ornamental. There are the orange, grapefruit and kumquat, and the various tropical fruit trees such as the avocado, mango, sapodilla, tamarind, rose-apple, gooseberry and mammee apple.

We can also have beautiful lawns here with but little trouble. The Bermuda grass grows well where not too shady, but for shady spots St. Augustine grass is best and grows equally well in dense shade or sunny places. It stays a pretty green all winter and is easily mowed, being a wide blade grass and not as wiry and tough as the Bermuda.

Essential Oil Farming in Florida

Samuel C. Hood
DEPT. OF AGRICULTURE, WASHINGTON, D. C.

Mr. President, Ladies and Gentlemen:

There is probably no state where the cultivation of so many species of economic plants are tried as in Florida. Our population coming, as they do, from all parts of the world, bring with them the plants they have grown in their own country, or in other parts of this country. Our wide range of soil and climatic conditions make success possible with a large number of these plants, and there is probably no Horticultural Society whose reports cover as many species of fruits, vegetables, field crops and ornamentals as this Society. It is not my purpose today to add names to the already long list grown in the State, but to give some additional information concerning plants which have already been reported to you, and to report the results of several years' experimental work with them.

Every year we pay foreign countries more than five million dollars a year for camphor and essential oils. Practically all the materials used for the manufacture of perfumes, toilet preparations, disinfectants, soap scents, and a large portion of our flavoring extracts are of foreign origin. While some of these materials are secured only in the tropics, and cannot be produced in this country commercially, yet by far the larger amount can and ought to be produced in our own Southern States.

As many of you know, the U. S. Department of Agriculture has for the past five years maintained in this state an experiment station for the experimental work on the commercial production of camphor and essential oils in Florida. This station which was established primarily for the camphor work, has enlarged the scope of its work until at present we have under cultivation more than 50 species and varieties of plants yielding essential oils of commercial importance, and through our introductions from foreign countries the list is continually growing. In this brief paper I shall mention only a few of the most promising ones.

By far the largest single item in our list of imported aromatic products is camphor, with a market of about two million dollars a year. As you know, practically all of this product is secured in the mountains of Formosa and is in the hands of the Japanese Camphor Monopoly. The gum is secured by the steam distillation of the wood of native forest trees, and is carried on in the most primitive manner. The workmen are pushing further and further into the savage districts of

the island, and it is probably only a question of 30 or 40 years before the wild supply is exhausted, and the industry can only be perpetuated by reforestation and cutting the trees as is now done; or by planting the trees in groves, and trimming off the leaves. Since a tree must be at least 50 years old before the camphor content is sufficient to make cutting profitable, it is probable that the camphor industry of the future will be an agricultural one, and the gum secured by the distillation of the leaves.

In order to carry out this method and to make possible the use of machinery instead of hand labor, the trees should be planted in hedges about 15 ft. apart and kept trimmed back to the convenient height of about eight feet. The trimming can then be done by machinery and the material secured at a minimum cost. Let us follow the various steps from the planting of the seed to the manufacture of the product.

First of all camphor planting cannot be made profitable on a small scale. The cost of the equipment for the production of the gum at a minimum cost is considerable and would not pay on less than 400 or 500 acres. The camphor seedbed should be located on land as free as possible from weeds and with a fair supply of moisture. With these conditions no special appliances such as slat sheds or irrigation are needed. The soil should be gotten in good mechanical condition the previous summer, and freed from all trash and weeds. As soon as the berries are ripe, which is about the middle of October, they should be gathered and planted at once. A very good method of planting is to lay off the rows with a six-inch shovel plow and sow the seed about two inches apart in the drill. A common smoothing harrow can then be used to cover them by running it lengthwise of the rows. If the rows are placed twelve inches apart, one acre of seedbed will require 250 quarts of seed, and will give sufficient trees for setting 200 acres of hedges. If the seeds are planted before Nov. 1 germination may be expected during the last of February, but it will be the middle or last of April before a full stand is secured. The importance of having a seedbed free from weeds is thus readily seen. During the first summer careful cultivation should be given, and commercial fertilizer may be applied after the dry weather of the spring is passed. It is better, however, if the soil can be made fertile enough the previous year so that the addition of commercial fertilizer is unnecessary.

Fourteen months after the planting of the seed the trees are ready for setting in the field. Our experiments have shown that better results are secured if the trees are set at this time, than if left in the seedbed for another year. The trees can be dug with a tree digger, and the tap root should be cut about a foot below the surface of the ground. The entire top should be cut off about six inches above the ground leaving simply a straight stick of tap root and stem about eighteen inches long. These small trees can be set by hand very rapidly, or a common transplanting machine can doubtless be easily adapted for this work. The trees should be set in checks 15x6 feet, and it is well to raise a small bank about them to nearly

cover the stem and protect the buds from late spring frost. The first winter in the field is the only real danger time from frost.

Four years from the time of setting, the trees should be eight feet high and ready for the first trimming to shape up the hedges. The cost of cultivation for these four years can be carried by planting some general farm crops between the rows. Our plan is to trim the hedges A shaped, eight feet high and eight feet wide, but we are also trimming small blocks to other sizes for comparison.

The camphor content is highest in the leaves during the dormant period so there will be two trimming seasons a year. One during the winter and the other during May and June. We have found that the camphor content is greatly increased by trimming the trees, and that moisture and plant food has considerable effect on the yield. These are, however, points on which more work needs to be done, and experiments along this line have been started.

From our work so far, we find that the green trimmings will yield about 30 pounds of camphor to the ton, and that about five to six tons of trimmings will be secured to the acre per year.

The camphor is secured from the leaves by the regular process of steam distillation. The trimmings are placed in large wood or metal retorts and steam passed through the charge. The steam takes up the camphor and the mixed vapors pass from the retort into a suitable condenser. Here the steam is condensed to water, and the camphor vapors cooled to a crude product which resembles but little the refined camphor of the market. This crude product is about eighty per cent gum and the rest is camphor oil. By special refining processes, the oil is removed and from it is secured several oils which find a ready sale in the varnish and paint trade, and to a certain extent in the chemical industries. The oil-free camphor is then refined by sumlimation in iron kettles, and the result is the clear cakes of gum ready for the market. This refining of the crude camphor could not be handled except in a large plant and under the control of skilled men, but there is no reason why the crude Florida product should not become a regular article of trade on the same basis as that now secured from Japan. The estimated yield of camphor to the acre is from 150 to 180 pounds per acre, which at the present prices should give the grower $60.00 to $70.00 per acre. After deducting the cost of production, fixed charges, etc., the net profit probably would not exceed $25.00 to $30.00 per acre. It is not a large profit, but there are many of our agricultural industries which are carried on successfully on a smaller profit than this.

In addition to camphor there are other essential oil plants which have commercial possibilities in this state. With many of the species our work has not gone far enough to warrant an opinion as to the outcome, but a few of them have been handled in sufficient area and for long enough time to give us some information concerning them.

LEMONGRASS AND CITRONELLA

This country pays annually upwards of a half million dollars a year for the products of the oil grasses of Southern Asia. There are several of these grasses yielding oils of value in the perfume trade, but the most important are lemongrass and citronella. The lemongrass has been extensively grown in this state as a border plant, and is familiar to most of you. The oil is secured by the distillation of the green grass, and is largely used for scenting soaps, ointments, and as a raw material for the manufacture of artificial violet. Lemongrass does very well in the lighter soils of the state, and when once established can be handled for several years without replanting. The best quality and highest yield of oil has been secured on the common high pine lands of the state where with the same amount of labor and fertilizer as would be expended on a corn crop, eight to ten tons of green grass can be secured per acre after the first year and will give a profit which will compare well with other farm crops.

In the regions of India where this grass is grown there are several varieties, but only one produces the high grade commercial oil. The common form in this state yields a low grade oil, and belongs to one of the inferior Indian sorts. In starting a plantation care should be taken to secure a variety which will give an oil soluble in three volumes of seventy per cent alcohol and showing by analysis over seventy per cent citrol. Several varieties are being grown in the experimental grounds and work being done to develop a form well suited to Florida conditions and yielding a high grade oil. Work is also being done to determine if it is possible to influence the quantity and quality of the oil by the application of chemical fertilizers to the soil.

Citronella grass which is closely related to lemongrass, produces an oil of an entirely different sort. This oil is used in scenting soaps, polishes, finer lubricating oils, and as a cheap scent in a large number of compounds. In its pure state it is also used as a preventative against mosquitoes. Our experiments with this plant are not complete enough to determine whether it has a commercial future in this state. So far, however, it has not made the robust growth of lemongrass.

CHINESE CINNAMON

This tree which has been extensively planted in Central and Southern Florida as an ornamental is almost as hardy as camphor. There is an importation of many thousand dollars a year of the oil distilled from the leaves and twigs of this tree. It is probable that it could be grown in hedges in the same manner as camphor, and the oil distilled from the trimmings. The bark is also of considerable value, and our importation of Cassia bark from China is nearly a quarter of a million dollars a year. Experiments are being conducted with this tree to determine if its cultivation can be made profitable in this state, and to determine if the Florida grown product is fully the equal of that we now buy from China.

ROSE GERANIUM

This plant is extensively grown in Southern France, Algeria and in the French colonies of Africa. From the leaves are distilled an oil of very great value in the perfume trade. The commercial culture of this plant has been frequently tried in this country but it seems to be attended with unusual difficulties. It is probable that the growth of the plant and the quality of the oil is grealy affected by soil and climatic conditions. In the distillation of the oil great care must be taken, and a proper apparatus used if a high grade oil is to be secured. At present we are growing several varieties of this plant from the geranium regions of the old world, and are trying to determine as far as possible its requirements of climate, soil, moisture and plant food.

CITRUS OILS

While Florida is one of the larger citrus growing regions of the world, yet almost nothing has been done here in the way of working up the by-products of this industry.

In 1909 the following Citrus by-products were imported. The figures given are in round numbers.

Lemon oil	$ 358,000
Orange oil	151,000
Bergamot oil	281,000
Neroli oil	170,000
Lemon, lime and sour orange juice	81,000
Citrate of lime	489,000
Citric acid	74,000
	$1,604,000

This gives us a total of more than one and a half million dollars, and to it must be added a considerable for candied peel, and the oil of petitgraid distilled from the leaves and twigs of the sweet and sour orange. While it is doubtful if the bergamot could be grown except in the very southern part of the state, and the lemon has never been of gerat commercial importance in Florida, yet the production of orange oil, neroli oil, petotgrain oil, candied orange peel, and concentrated orange juice may be considered as by-products in the orange industry. We pay foreign countries more than $800,000 a year for these products and yet almost no atempt has been made to utilize the orange culls, drops, fallen flowers and prunings. It is by no means certain that this can be done profitably with our prices of labor, but the matter is at least worth investigation.

The orange oil of the market at present is manufactured in Sicily, where by the most tedious hand methods the fruits are peeled and the oil pressed from the fresh peel by hand one piece at a time. A good workman will produce about two pounds of oil a day, and for his labor received about thirty cents. Manifestly then our first problem will be to devise machinery to do the work of this cheap foreign labor, and we are of the opinion that this will not be difficult.

During the past year some work has been done along this line. A peeling machine has been constructed, and work done on the utilization of cull oranges for oil and citric acid. A large amount of work on processes, and careful analyses of products will be necessary before we can

determine whether the manufacture of these by-products is commercially possible in this country, but we believe we are justified in giving the matter attention.

WILD PLANTS

In the introduction of new plants for this state, we must not neglect some of the native ones. The flora of Florida is very interesting, and a careful study of it from the chemical standpoint will doubtless show us that in our common and despised weeds are oftentimes industries of considerable importance.

Our common *Monarda punctata,* called peppermint in this state, but not a peppermint at all, grows as a roadside weed in all the sandy portions of the state. This plant in its green condition contains $5.00 to $7.00 per ton worth of thymol, a most important drug for which we now pay foreign countries many thousand dollars a year. This plant is a perennial and when once established can be harvested for several years with a very slight amount of cultivation and labor. By the distillation of the green herb seven to eight pounds of oil to the ton are secured, and from this oil the thymol is extracted. For the past three years we have had this plant under cultivation in considerable area, and by the selection of the plants have been able to very greatly increase, not only the yield of oil but also the per cent of thymol in the oil. We have raised this percentage from fifty to seventy and the end not yet.

It has been said that wherever a disease is prevalent, there also is to be found the remedy. Since we are now being told that we all have hookworm, it is interesting to note that thymol, its remedy, can be produced commercially in Florida.

MENTHA CITRATA

Another wild plant of promise is the *Mentha citrata.* On distillation this plant produces an oil which somewhat resembles lavender, and can be used for many of the same purposes. Unlike most of the plants I have mentioned it requires moist soil. We are trying to work up a variety adapted to the sandier soil, and are meeting some success. It is interesting to note that at the same time, we are also getting a higher yield of oil and of better quality.

With the exception of the peppermint industry in Michigan, Indiana, and New York, the wormseed industry in Carrol County, Maryland, and one or two others of minor importance, the cultivation of essential oil plants in this country has never been taken up. The use of these plant products in the United States is continually increasing, and it is time that we investigated the possibilities of a home supply. There is, however, an immense amount of research work to be done before this industry can be established.

At present we know very little of the soil and climatic requirements of many of these plants, or the part chemical fertilizers will play in their cultivation. In handling the crop must be worked out on a basis adapted to American conditions, and most important of all is the devising of machinery to do the work now performed by the low priced labor of foreign countries.

It is not an industry to be taken up rashly. Prices of land, labor conditions,

and competing crops are all factors to be considered. In most cases the profits are small, in general not more than $30.00 to $40.00 an acre, and with some plants perhaps even less than that. It has the advantage, however, of sending to the market a high priced concentrated product, which is not perishable and will take a very low rate of freight. In this state our light soils and intenst sunlight are favorable for the formation of essential oils in the plants, and I believe there is a good future for essential oil farming in Florida for the man with energy, experience in the work, and with a personal inclination towards the development of new industries.

DISCUSSION

Mr. Hume: You have just listened to a very interesting paper on a subject that is very difficult to get information about. The question has been frequently asked, what can be done. If there are any questions, I am sure Mr. Hood will be glad to answer them.

Mr. Hartmann: I would like to know more about bergamot, as it grows wild in this section.

Mr. Hood: I have seen only two or three bergamot trees in Florida; however, I have not searched diligently for bergamot. I expect some of the citrus growers would be able to inform me of its distribution. I expect bergamot would be limited to the very southern portion of the state, because it is one of the least hardy of the citrus yield.

Mr. Hartmann: How large do the trees grow when well grown?

Mr. Hood: The bergamot resembles an orange tree very much. It is one of the members of the citrus family.

Mrs. : What about cajuput?

Mr. Hood: Cajuput is being tried, but it is one of the plants we have only given preliminary tests. I do not know how we are going to come out with it.

Now, the fact that plants can be grown in the state does not indicate that they have commercial value. If you can grow a crop that will net you $40.00 an acre, and another that will net you $100.00, you are very foolish to grow the $40.00 crop.

Prof. Rolfs: There is a fruiting bergamot tree on the sub-tropical laboratory grounds. This does not establish the fact that this region would be a good region for the tree, but I simply give it to you as information.

Mrs. : Is there not a little plant that is also called bergamot? Has that any commercial value?

Mr. Hood: The bergamot plant, I think, is the same thing as I mentioned as the Mentha citrata. The oil has a lavender scent. It is a very promising plant. In fact, I think it will be possible to replace, to a very large extent, the lavender importation.

Mr. J. A. Stevens: The professor has spoken of certain grasses from which the oils are expressed. I would like to know if the residue is of any value.

Mr. Hood: In some places, the oil grasses, when taken from the still, are used as a famine feed for animals. The plants take from the soil only the hydrogen and the carbon, and by putting this waste material back on the soil as a

mulch, you return to the soil practically everything you take from it. It has a slight fertilizing value.

Mr. Blackman: What is the trouble with the camphor tree? I notice in the last year or two that most of our camphor trees are brown and seem to be diseased.

Mr. Hood: During the past two years I have noticed a very general infestation of the red spider, and I suspect the trouble Dr. Blackman refers to is that caused by the red spider. I think that will give very little trouble in commercial operations, because the foliage will be removed every year.

Mr. Parker: I would like to ask the possibilities of camphor which has been produced from turpentine.

Mr. Hood: Synthetic camphor, you mean. There have been something over 400 patents in Europe and four patents in the United States; one of them in your own state. There are some people in the state who remember that, to their sorrow.

There has never been but one company produce camphor synthetically successfully, and that company is producing it in Germany. They are filling their contracts now at a loss. With the natural camphor selling below 60 cents a pound, the synthetic camphor cannot be reckoned with. It is impossible, at the present price of turpentine, to manufacture synthetic camphor for less than 60 cents a pound. Turpentine is the only raw material from which it can be produced, and when you base the process with turpentine as the raw material, you are taking a material that is certainly not growing more plentiful.

Origin of the Hardpan of the Flatwoods and the Conditions Under Which It Forms

By E. H. Sellards.

Mr. President, Ladies and Gentlemen:

The term hardpan, although used for a variety of conditions, may be defined as any substratum in soils that interferes with the growth of plants. Although there are a variety of kinds of hardpan, there will be described in this paper only one particular kind occurring chiefly in certain flatwood.

The hardpan referred to is a dark-colored stratum variable both in thickness and in the depth at which it occurs beneath the surface. In the palmetto flatwoods country it is usually found at a depth of 18 to 24 inches. In higher and better drained lands, if present at all, it lies at a greater depth. The thickness of the stratum is likewise variable. In the palmetto flatwoods, where typically developed, it is usually 8 to 20 inches. In some other localities it is often much thicker, being sometimes five to ten feet thick.

The hardpan stratum consists essentially of sand more or less firmly cemented with organic matter. It is probable that in some instances iron oxide is the cementing substance, but as a rule certainly the cement is organic matter. The stratum is dark in color, due to the presence of the organic matter. When well dried out the sand cements often so firmly as scarcely to be penetrated by the soil auger. On the other hand, when thoroughly saturated with water the hardpan in many cases is entirely disintegrated. The chief objection urged by the farmer to this hardpan is that during dry weather it hardens to such an extent as to prevent the return of moisture to the surface by capillary movement. It forms, therefore, a soil that will not withstand a drought.

A typical soil section in the palmetto flatwoods where this hardpan occurs is usually about as follows: Light colored sands to a depth of 18 to 24 inches; the hardpan stratum very dark colored at the top, but grading into chocolate colored or coffee grounds color below, and finally giving place to light colored sands. Frequently the sands beneath the hardpan are described as quicksand.

It is the writer's belief that the hardpan stratum is caused by organic matter carried by rainwater from the surface into the sands beneath and there acting as a cement, and that the stratum forms at the water table level, or

at a level at which the water table stands during a part of the year.

By water table level is meant not the level at which the soils are moist, since under normal conditions the soil moisture rises by capillary movement to or nearly to the surface. By water level is meant the level at which the soils are saturated with water or nearly so. The importance of the water level on the character of soils cannot be over estimated. The conditions of soil formation above and below this level are radically different. Above the water level the air penetrated more or less freely into the soils. The dominant proccesses are therefore oxidation and solution. Moreover, the bacteria of the soils find favorable conditions for existence. Below the water table level the air is almost wholly excluded by the presence of water saturating the earth. Instead of oxidation and solution the dominant processes are deposition and cementation. Soil bacteria are largely excluded by the absence of oxygen. The roots of plants do not extend freely below the water table level.

The level of the water table is of course largely determined by the drainage conditions, both surface drainage and sub-drainage. Over considerable areas in central Florida loamy sands rest upon open porous limestone. In these localities sub-drainage is of course perfect, and the water table is frequently at a depth of 30 to 40 feet. Localities of this character may be found quite generally in Southern Suwannee, Columbia, Western Alachua, western and central Marion and in parts of Levy, Sumter and Citrus Counties, and in fact generally throughout the hard rock phosphate section.

In some other localities one finds good surface drainage but owing to the absence of limestones, or owing to the fact that clays intervene between the surface soils and the limestones, sub-drainage is less perfect. In such areas where the slope is considerable and the drainage good the water table level lies at some considerable depth, often ten to 20 feet. Where the surface is level and especially where clays occur the water table is near the surface. In the large extent of country known as the flatwoods the water table is normally near the surface.

From the agricultural standpoint the Florida flatwoods may be considered under two divisions. In the first the prevailing undergrowth, aside from wire grass, is scrub or saw palmetto, frequently interspersed with patches of gallberry. In the second type, aside from the heavy matting of grasses there is little or no undergrowth. The first type of flatwoods may be called the palmetto flatwoods from the prevailing undergrowth; the second may be known as open flatwoods or pine meadows.

The palmetto flatwods are somewhat better drained than the open flatwoods or pine meadows. The palmetto in fact will withstand only a limited amount of moisture, while the pine meadows verge on the swampy. The water table level in the palmetto flatwoods is at the surface during the rainy season, but during the remainder of the year lies at some depth beneath the surface. In the open flat-

woods the water table is usually near the surface during all the year.

I have thus described the drainage conditions at some length because they have, as I believe, an important bearing on the question of the formation of this type of hardpan.

Following the rainy season the organic matter from the surface is carried into the earth. Where the drainage is good the organic matter is carried away in the circulating waters, but where the rainwater reaches a water table level and stands for some time, that is becomes stagnant, the organic matter cements the sand. As evidence of this the following facts may be noted: Land that has thorough sub-drainage as in the case of loamy sand overlaying the limestone, has no hardpan of this type at all. Land that has fair surface drainage but no subdrainage may have the hardpan, but when this is the case the hardpan always lies at a considerable depth, that is it does not lie above the level at which the water table stands for any considerable part of the year. As an illustration of this the following locality may be cited. The cut of the Seaboard Air Line railway at the crossing of the Trail Ridge near Highland, shows the presence of hardpan at a depth of ten or twelve feet. The surface drainage here is good, as this point is supposed to be the highest in eastern Florida, but there is no limestone to facilitate subdrainage. Other similar localities may be seen throughout the State.

In the palmetto flatwoods the drainage is imperfect and the land is more or less flooded during the rainy season. After the rainy season, however, the surface water runs off and the water table stands for a time at one to three feet below the surface. In accordance with these facts hardpan is found in this type of country at a depth of 18 to 24 inches below the surface, or at the level below the surface at which the water stands for a time. As regards the pine meadows or the open flatwoods, it may be noted that this type of land is practically always moist, the water table being very near the surface. Under these conditions the hardpan does not form at all, the organic matter remaining in an uncemented condition at the surface.

As further evidence that the hardpan is cemented by organic matter carried below by the rainwater it may be noted that the sands above the hardpan are light in color and largely free from organic matter; also that the topmost part of the hardpan stratum is very dark, having an abundance of organic matter, grading below into lighter color, and finally giving place again to light or gray sands usually saturated with water and hence called quick sand.

It is a noteworthy fact that hardpan of this type and the saw palmetto are almost invariable associates. However, in a few instances, under exceptional conditions, the writer has found the saw palmetto without finding underneath it the hardpan. On the other hand the hardpan has been found in a few instances where the saw palmetto was absent. It is therefore apparent that the saw palmetto is not essential to the hardpan, nor the hardpan essential to the saw palmetto. However, the conditions which favor the palmetto are closely similar to those that produce

the hardpan. It is quite possible that tannic acid which is present in the palmetto roots, is one of a number of organic acids that take part in the reaction that results in the formation of this type of hardpan. Its almost invariable presence under land on which the palmetto grows would thus find an explanation.

The writer recognizes that these remarks on hardpan are purely preliminary in nature, and merely lead up to the many questions associated with this line of soil study, and particularly with the question of how to utilize hardpan lands, the latter being the crux of the whole problem. We have in Florida, many million acres of land of this type of soil, most of which is at present unused, and it is the problem of the horticulturists and agriculturists to find how best to utilize the land. Much promise is found in the observation that where thoroughly saturated with water the hardpan stratum in many instances disintegrates allowing the free circulation of water through it. It is therefore probable that in the large areas of the State where flowing artesian wells are secured or where water can be otherwise cheaply applied, this problem may solve itself. In certain localities hardpan lands are now being used. In fact some of the very high class and high priced trucking lands that are now producing in the State are lands in which this stratum of sand filled with organic matter intervenes as a rule between the surface and the clay subsoil. Believing fully in the utility of these lands the writer urges the importance of more information in regard to them, and of further experiments in using them.

DISCUSSION

Mr. Sample: If that hard pan were disintegrated, would it be good for oranges?

Dr. Sellards: I have never seen the hard pan entirely disintegrated; that is, during the wet, rainy season it may seem to be disintegrated, but during the dry season it seems to harden up. When saturated with moisture it might appear to be thoroughly disintegrated, but when the water is out of it that same hard pan would seem to harden again .

Mr. : Do you find roots growing through this hard pan?

Dr. Sellards: I have found it where the roots of the pine tree could not get through the hard pan, but were deflected just as though they had struck a rock.

Mr. : What is the effect of a subsoil plow?

Dr. Sellards: I do not know what the effect of a subsoil plow would be. During the dry season it would be very difficult to plow it.

Mr. Hubbard: I would like to ask some one's experience with dynamite breaking up hard pan.

Dr. Foster: This matter of hard pan is, or was, a problem in the Sanford celery district. We have a hard pan eighteen inches below the ground. There are flowing wells which bring the water above the ground, and from these flowing wells are put in mains which drain by gravitation along the top of the ground. Every twenty feet laterals are put in of twelve-inch tiling

and this tiling is joined so that the water will seep out every foot.

Mr. Paul W. Orchard: I have been working some time with dynamite on hard pan lands, particularly in the neighborhood of the Caloosahatchie river near Ft. Myers. Some of the groves I worked on were underlaid with hard pan at a depth of eighteen to thirty-six inches. The trees were manifesting a peculiar yellowish color and seemed to have reached stagnation. They would not respond to proper treatment of fertilizer and the younger trees were not growing as rapidly as trees that were not planted on hard pan. The method of treating was to shatter the hard pan beneath the tree, allowing the roots of the tree to permeate through this hard pan and allow the air to get through the particles of soil to the roots of the tree. This we felt sure would improve the drainage conditions which, as the land was low, were bad. The hard pan was utterly impervious to soil water and had a tendency to hold water during the wet weather, and then during the winter when the water was below it, to restrain the roots of the trees from getting to it, not permitting it to be drawn up toward the surface by capillary attraction. The results, so far, have exceeded our expectations. Almost immediately after treatment, there was an improved color and tendency to rapid growth. The grove of which I am speaking particularly is putting on more growth than it has any season since it reached the stage where the hard pan stratum interfered with it.

In another grove of trees about three years old, planted on hard pan, exceedingly wet soil, we exploded a charge of 30 per cent. dynamite beside each tree, about eighteen inches from the tree and also in the center of the check. The ground was shattered and the trees were raised as the soil was loosened. It seems to be a cure for the conditions which we believe cause dieback, and the trees have put on a heavy growth of foliage, thus far justifying our theory that the aeration of soil will minimize or eliminate the damage by this disease. Within the last six weeks, we have covered some 160 acres.

Mr. Thompson: May I ask the gentlemen who has experimented with dynamite if he has blasted trees where he has not used fertilizer?

Mr. Orchard: Yes, we have. The effect has been a darkening of color of the leaves and advance of growth, very much the same as that encountered where we follow with fertilizer, except that the growth was not so vigorous. We have worked on trees of all ages, varying from trees that had been set only nine or ten months to those that were thirty or forty years old.

Among large trees, capable of bearing five boxes of fruit, or more, personally I prefer 30 per cent. dynamite, a four-ounce charge. Under a tree capable of bearing ten or more boxes of fruit, I would consider one charge of 30 per cent. dynamite, four ounces, ex-

ploded beneath the tree in the hard pan where the stratum exists within six feet, insufficient, and would advise an additional blast in the center of the check. Otherwise, if it is a very hard and compact soil, not underlaid with hard pan, I would use it at about thirty-six inches, varying the depth according to the results indicated by the first explosion or two. Then in the center of my check I would use eight ounces of 30 per cent. dynamite, or more, if I felt justified in it; that is, if the hard pan was unusually hard and the trees seemed in need of the stronger shot, I would use the higher percentages of dynamite, 40 per cent. or 60 per cent.

Mr. Hart: This is an interesting subject. In the paper we have just heard, it seems that under certain conditions the hard pan disintegrates and then under other conditions it re-forms. Is there any probability,, after dynamiting the stratum, that it will re-form, say, after a moist spell followed by dry weather, then will you have to dynamite it again, or will the conditions be such after the first explosion that it is not likely to have to be repeated?

Mr. Orchard: My own experience has been that there is very little tendency to re-form; that if, after the explosion the sand and hard pan are so thoroughly mixed as to apparently prevent any re-forming. I have never noticed any case of a tendency to re-form, but would prefer that Dr. Sellards answer that question.

Dr. Sellards: It is possible that it may not re-form. The hard pan, no doubt, was formed a long time ago by certain conditions, and if the drainage conditions are changed and the hard pan is broken up, it may not re-form. Of course, only experience will prove this.

Prof. Rolfs: I would like to ask the gentleman from Arcadia how long since he began these experiments. The time limit has rather an important bearing on this.

Mr. Orchard: It is, indeed, a very important element to consider, and the results are eagerly awaited by the workers with dynamite in the citrus belt. Dynamite in other sections, under somewhat similar conditions, has been used for upwards of twenty years, but in Florida the idea is new. We can date our experiments only, I am sorry to say, from the first of January, beginning as we did at a time when the trees were in a dormant condition, which we believe is the proper time to do the work. All we can claim is very close observation of what has taken place thus far, and if the groves upon which we have been working will continue the same progress that they have made in this short time, we will be delighted. We see no reason why they should not. We are thoroughly satisfied that nothing will stop or hinder the progress unless there is some limiting factor now unknown which will manifest itself later.

Mr: Hartmann: I would like to ask the state geologist if there has been anything along the line of chemical applications which has been proved successful in breaking up this sub-soil.

Dr. Sellards: I do not know of any. I have not heard of any at all.

Mr. Penny: I would like to make a few remarks about this hard pan that I have had in my grove for a good many years. We find that wherever the hard pan is located, if the water can drain off on either side there is no harm in it, but when it forms a basin so that the water cannot get out, you had better make a drainage for that basin. The dynamite proposition is all right, for by breaking up the hard pan the water can go through the bottom. In handling our grove we use open tiles put down through the hard pan; we put them across the grove every 400 or 500 feet at the outside. In every piece of ground where there is hard pan, we cut through these basins, if we don't, it would ruin us. This basin has to be drained, and that is all there is to it. If you don't, you won't have a grove.

Capt. Rose: I would like to ask the last speaker what his experience has been as to the drying of the hard pan; if he does not find that by becoming dry this hard pan does not become a friable and easily broken soil

Mr. Penny: Yes, it will do that.

Capt. Rose: I do not like to take issue with our state geologist, but my observations where canals are being cut have been that the disintegration occurs more rapidly when dry than wet. In some places where ditch cuts have been made, and the hard pan thrown up on top of the earth pile, where it was exposed to the air and the sun, in a few months it would disintegrate and break down into very desirable condition. That has been my observation.

Mr. Penny: That corresponds with ours. Of course, all hard pan may not, and probably is not of the same formation, but I have noticed the condition of which you speak.

Capt. Rose: That is true; the chemical composition of the hard pans are very different. Some, apparently, are entirely made up with organic matter, and others seem to be formed with mineral matter, or oxide or iron.

Mr. Penny: I am not in position to tell anything about the chemical composition of the hard pan. My observation goes solely by color and texture of it.

Dr. Sellards: When a ditch is dug and the hard pan is exposed, it is then subject to weather condition. It is true that this hard pan is extremely variable; we hardly find anything about which there is not considerable variation. Of course, all has to be taken account of. What might be true in one vicinity might not be true in another. It is necessary to thoroughly understand the nature of your hard pan before trying a special treatment.

Report on Tropical Fruits

John B. Beach

In this report I will only discuss the three tropical fruits which have attained commercial importance with us, the pineapple, mango and avocado. To attempt to describe the host of others which supply our home table and find their way into nearby markets, would greatly exceed the limits of this article. I will mention, however, that the Department is making exhaustive researches into the Anona family, and in time we are likely to have the best of this fruit in the world at our command. This is the family to which belong the famous Cherimoya of Peru and the Custard Apple grown in Europe in hot houses. The world-renowned Mangosteen, whose fame we have heard from childhood, and which has never yet been fruited succuessfully outside of the Malay Peninsula and adjacent islands, has been taken hold of at Washington, new methods of propagation discovered, and the prospects are that some day we may fruit it in Florida. The pineapple industry has gone through a severe strain in the past few years. A vast increase in acreage in Porto Rico and Cuba, backed by American capital and developed by experienced Florida growers upon up-to-date lines, has glutted the markets. As a result in 1908 prices were not remunerative, and in 1909 and '10 were far below the cost of production. Growers were forced out of the business, fields abandoned, and new planting abandoned. The acreage in Florida has been reduced one-half since 1909, and a similar process has also occurred in the islands, so that last summer the reduction in output had re-established former economic conditions to a large extent. In Florida a severe drought reduced the size of the fruit so much that prices were still rather low; as nearly as I can gather from different sources, the average prices were about $1.50 per crate, while the small size reduced the total yield per acre, though good sized fruit was in active demand, and sold as high as in former years before the glut occurred. The growers who still hung on, thus encouraged, fertilized freely, and with abundant rains the crop this season promises to be a good one and prices as remunerative as of old. One grower has sold his entire crop for $1.75 f. o. b., and he thinks this price will prove not below the average. The greatest reduction in acreage has occurred in lower Palm Beach and upper Dade counties, in which section the farmers have been able to fall back on winter truck growing for a living. Many fields have been pronounced "run out," the land either "exhausted," or the plants reduced in vitality.

Those who believe the former to be the trouble have tried hauling in leaf mould or burying old plants for humus, or merely allowing the land to lie fallow. To the latter I can give a word of encouragement. The other day I passed by a field at Eden, which 20 years ago was cultivated in pines by the late Capt. Richards, and is now covered with a thrifty young patch just coming into bearing. Those who believe that the plants have become exhausted, last summer imported slips from Cuba and Porto Rico to infuse new blood, the results of which plan only time can tell. My own theory is that too much mineral fertilizer has been used in many cases, which experience has proven has a bad effect upon the vigor of plants, and a more liberal use of tobacco and cotton-seed meal would go a long way towards correcting the trouble where it had not gone too far.

Treating pineapples for fungus and insects in the field has not proven a satisfactory proposition, and the better plan is to keep up the vigor of the plant with plenty of proper fertilizer from the start, and let nature protect itself.

A good deal of new hickory ridge land has been planted in St. Lucie county, from Ft. Pierce northwards, and the fields are all looking well. On the whole the prospects look good for the industry, in my opinion.

The Avocado crop in Dade county is reported to be a failure this season, while in Palm Beach county it seems little below the average. One pioneer grower in Dade county says that this is the first season in 12 consecutive years that the Trapp budded trees have failed to make him a good crop, and this year three-fourths of the fruit have dropped in his section. All seem to attribute this to the damp, rainy weather during the blooming time, and since then a consequent attack of fungus similar to that which blights the young mango. This trouble is being investigated very exhaustively by the Department, and some feel assured that should next season be wet the trouble can be absolutely controlled.

The Trapp stands at the head of the list of varieties for commercial planting, its lateness bringing it into the market after the bulk of the others are gone. Its excellent quality, round shape and solidity and keeping qualities give it preference over other varieties which mature fully as late. And then the test of 12 years on the budded trees and 15 or 20 on the parent, constitute a pedigree of great weight in such an infant industry. A good early variety is now much desired, and I will mention two that are competing for this place. One belongs to Mr. H. H. Harrison and he has named it Estelle. He says that there are several trees grown from a certain lot of seed planted in 1899 by Mr. Jas. T. Truitt, and that all the trees from this lot of seed seem identical in character. He describes the fruit as "medium size, short neck, yellow-green solid and meaty, close-fitting seed and fine nutty flavor. Can be picked from the 1st to the 15th of July. Mr. Dwight Allen of West Palm Beach has a seedling which he calls "William," which answers almost precisely to the foregoing description, except that the color is dark green,

with scarlet cheek. I am not sure that the seed is absolutely tight-fitting, but think so. This is an important matter when it comes to long shipments. I am indebted to Mr. Chas. Montgomery for the following notes on his own experience. He writes: "Any information we can give you must of necessity be meagre, as our experience extends only over a period of about seven years. One of the serious features of the Avocado industry is that growers in gathering and packing the fruit handle them as roughly as they would tomatoes or citrus fruits. As a matter of fact, to get your Avocados in market in the best possible condition, they should be handled as carefully as a setting of eggs from a prize strain of chickens. They should be gathered when they are cool, or if they are gathered when the sun has been shining on them, they should be quickly put in the shade and not be packed for several hours, giving them ample opportunity to lose their heat. Avocados should be graded as to color, shape and size. Green fruit should not be packed with red fruit. Bottle-necked should not be packed in the same crate with round fruit. A pound fruit should not be packed with the two or three pound. Using the tomato crate or standard carrier without baskets lined with corrugated paper, or bedded with excelsior with one or two sheets of pineapple wraps to cover the excelsior, then to wrap the fruit in orange wraps, is, in our opinion, and the opinion of our customers, the most desirable manner of preparing what we call a 'stripped' crate. We use the term 'stripped' to differentiate between the basket crate and the crate without baskets. By using four baskets, we can put much more fruit in the crate than we could if we used the six, also pack much better. In the basket crate, six fruit to the basket, or 24 to the crate, is a good, medium sized fruit, and will weigh from 1 1-4 to 1 1-2 pounds. Same sized fruit packed in a stripped crate will number 36, depending, of course, on the thickness of the cushion of excelsior, or whether we use the corrugated paper. In the stripped crate we have found our sizes will run 12, 18, 24, 36, 42, 48. While we pack and ship fruit smaller than 48, it is not advisable to do so. * * * As to prices, we most assuredly got more for our late fruit. Very early fruit, in our experience, has proved not as profitable as fruit medium late; very late, either. Most of our large fruit is of early variety, and we obtained from $1 to $3 per dozen f. o. b For our late fruit we obtained from $1 to $6. Some seasons as high as $12 per dozen. The midseason fruit, which is mostly made up of seedlings, has not been profitable the past season. Fancy trade desires the uniformity in quality of the fruit, and with the seedlings it has not been possible to test every tree when you are handling any quantity of fruit. The loss is ofttimes dissatisfied customer and the fruit does not always carry well, and if you have a large supply and consign it at that time of the season you obtain very small prices. Some two or three times during the season we paid 25 cents a dozen for seedlings. We packed the best of them to our private trade and consigned the remainder. We figured up net

results; we found a slight loss in the handling of them."

Mangoes have suffered more in this section from blighted fruit than Avocadoes this year, as in Palm Beach county, the crop seems to be only about 25%, though the trees bloomed freely, many of them several times. I am quite confident from experiments I have made in a small way myself that faithful use of Bordeaux will save much of your mango crop in a rainy spring, but you must begin with the first bloom. Exposure of the fruit to sun and air as much as possible is of value, whether done by pruning, propping up, or clipping away the foliage from about the fruit, and it serves a double purpose. Where the sun shines on one side of the fruit a bright red cheek develops, which is never found on fruit grown on the inside of the tree in total shade. The tremendous demand for fancy mangoes will warrant almost any outlay for labor to insure a good crop. Good Mulgobas have never failed to find a ready market at $3 per dozen f. o. b., and the demand has never been supplied at that, while some growers sold for $4 last summer, and I heard of one party who got $400 for the crop from three trees. As to varieties, the Mulgoba still stands at the head, though many new sorts have been fruited, and some show great merit. The test of time alone can prove their relative value. The Sundersha still holds the record for reliability, heavy yield and large size, and is the standard variety for the household. My tree is loaded with its seventh crop and has enough quarter-grown fruit to break down ten trees of its size if all came to maturity. Unless they drop very freely soon I will have to go to work as I did last year with a clippers and thin them out. It has never failed to produce all the fruit the tree could support and began to bear at 2 years from the graft. It is specially adapted for cooking and preserving, and can be cut for that purpose when the fruit is but two-thirds grown. Many varieties imported from India by the Government have been dropped on fruiting, as not worthy of further trial, but many are proving promising, and are being carefully observed year after year to establish their record. Among those might be mentioned Cambodiana, Bennett, Rajpury, Fernandez, Hadens' Seedling, Cecil and many others which all possess merit. The Department reports only 3 importations as having fruited for the first time last summer: Gola, described as "of rather large size and good flavor, with little, if any fibre, with rather large seed." Singapur, "being a fruit above medium size with rather large seed, very little fibre and melting, juicy meat. Lamba Badhra "proved to be a rather small fruit, evidently of little commercial value." I have Itamaraca, D'Or, and Goa Alphonso in fruit this year, but the latter tree is under a shed closely crowded by adjacent trees and it did not get the Bordeaux in time to head off the fungus, and only three half-grown fruit are now left on it. The others are pretty well exposed to the sunlight, and I think will mature some fruit.

We used to think that the pineapple had no enemies, and then for years we

believed that the Avocado and Mango had none. But as the trees multiply and we have more experience with them we learn that everything worth cultivating has its enemies. In a general way Mangoes and Avocados have similar troubles to citrus fruits. Withertip will attack both, though it is very seldom that it does; the guava fly, similar to the whitefly, will attack the Avocado, while certain scales sometimes feed on the Mango. But as compared with citrus trees it is less difficult to control the parasites, as these trees seem to have greater natural power of resistance. The Mango will thrive on land too poor and sandy and coarse for any citrus tree, and also in places too low and wet. The Avocado will not stand as wet locations as the Mango, nor succeed in quite as barren a spot, but wherever you can grow a grapefruit tree an Avocado will thrive. Under the above conditions and with the high prices obtained for the fruit, it seems to me as if South Florida would do well to plant more tropical groves, in which their relative freedom from cold gives them a great advantage, and leave citrus growing to the upper part of the peninsula.

Irrigation

C. H. Thompson

Mr. Chairman, Ladies and Gentlemen:

I had not expected to prepare much on this subject, preferring to leave the matter in the hands of the other members of this committee, who have had more practical experience in the matter.

Mr. Walter Drennen, a member of this committee has recently had some practical experience along the line of irrigation, and has had the assistance of some representatives of the United States Department of Agriculture, and he will be able to give us something good on the subject.

My experience in grove irrigation is rather limited, and has been confined entirely to the open furrow, or flooding system. Our grove is mostly situated on slightly sloping ground, so that water will run by gravity down the channels, or furrows.

Our plant located on the bank of one of our beautiful lakes, consists of a thirty horse power boiler, and a Deane Duplex Steam pump, with a six inch suction, and five inch discharge, and when in good working order has a capacity of delivering about twelve thousand gallons per hour.

Our main discharge pipe, five inches in diameter, runs through the entire length of our fifty acre grove, and nearly in the middle. This pipe is left in the grove as a permanent fixture. The lateral pipes we remove from grove when not in use.

Located at intervals of about one hundred and twenty feet along this pipe are crosses with three inch openings on both sides of the pipe, and a three inch valve to control the flow of water. We use three inch pipe for conducting the water from main pipe to the point where we wish to use it.

We begin our irrigation at the extreme end of main pipe, and lay a string of three inch pipe at right angles to the main, and to the extreme end of the grove. We take a turning plow and run three or four furrows between each row of trees, at righ angles to the main pipe, and parallel to the three inch lateral pipe. We open these furrows between each row of trees down to next valve in the main pipe. We next cross these furrows with furrows running at right rngles to the lateral pipe. These furrows down which the water is to run should always be plowed last, as they are left open to conduct the water.

The water runs down these furrows as far as we plow, or to next opening in main pipe, and is allowed to run over the ground and under the tree. It is kept in the squares by one or two men with

shovels, who place sand on the low places in the banks thrown by the furrows. When that square is full, we drop back another, and so on until we get back to the three inch pipe. Take off another joint or two of pipe and run water down the next row of trees, and repeat till we have reached the main five inch pipe.

With sufficient working force and pump power, and water supply, we can work both sides of grove at same time, and as the lateral pipes are taken off as used, they can be moved to the next opening in main pipe and connected so no time need be lost. These are matters of detail that can be worked out to advantage by actual working experience.

We find that the sandy soil absorbs the water quickly, and try to conduct the water as quickly as possible to the extreme end of furrow, and drop back to the pipe, as after the furrow is thoroughly soaked with water it takes water like a sponge. If furrow is given time to dry before use it will not absorb the water so readily. We have dug down in one of these furrows shortly after changing to another and found the sand very moist to a depth of five feet.

As soon as we have watered a sufficient area in the grove to run a harrow, we always break the top crust and keep a dust mulch to conserve the moisture.

The rains this season have been so timely and frequent we have not felt the need of irrigation.

Report of Standing Committee on Nuts

C. M. Griffing

Mr. Chairman, Ladies and Gentlemen:

As chairman of your committee on nut culture, I addressed a letter to the other members of the committee some two or three weeks past, asking their pleasure as to whether we would make a combined report, subdivide the subjects, or each make a separate report. Having had no reply from either of the other gentlemen on the committee, I will endeavor to make a report which I trust may be of some interest to members of your Society.

Enough has been said through the Agricultural Press, Bulletins and various other publications to convince the most skeptical of those who read, of the profits to be derived from pecan culture. Some of the statements and figures have no doubt been vastly overdrawn. Maximum yields from individual trees, existing under the most favorable conditions, and bearing hundreds of pounds of nuts per year, having been used in enumerating possible yields and profits from large acreages, giving the most vivid coloring to the unscrupulous speculators' and promoters' literature. While some may have been led astray and caused to lose money invested in land unsuited for pecan culture and in grove schemes promoted, in many instances, by men who themselves would not know a pecan tree from a china berry tree; yet I cannot help but feel that this advertising, though exaggerated and erroneous as some of it has been, has done Florida and the south a great good.

In these times of startling occurrences, the ordinary common-placed facts as we know them in every-day life fail to awaken interest in many a good and worthy cause or industry. It takes the startling to attract attention, and when once attracted to a substantial industry like that of pecan growing, the wild-cat speculative feature ceases and the industry settles down to a substantial basis.

The pecan to the farmer and planter of the south should be what the hen is to the American house-wife. A few trees around the home, around the barn and out-buildings, along the roadways and drives, from fifty to one hundred trees around the average home, of the large, soft shell, regular bearing variety, would not only produce a most pleasing and majestic effect on the landscape, but provide shade and an annual crop of the most nutritious and highly concentrated fruit product known in the horticultural world.

I do not wish to leave the impression that commercial pecan-growing on a large acreage basis is not well, or will not pay. I firmly believe that it will, and am largely interested in large pecan groves myself.

What I wish to impress is the lack of consideration given the pecan by the average farmer, the average fruit grower, the trucker, the dairyman, yea, even the home owner in the cities, the suburbs and in the country towns, and to awaken him to the fact that pecan trees surrounding his home and bordering his drives and roadsides, utilizing land not used for other purposes, would not only be a source of pleasure from the shade and beauty afforded, but an annual yielder of an income surpassing any other similar investment and amount of care necessary for their planting and development.

The pecan is not injured by freezes, is subject to but few insect enemies, a tree that responds to kind treatment, culture and fertility as no other tree, and one that after once established stands more abuse than any other tree.

If our brother horticulturists do not wish to get into the band wagon of future prosperity by planting an acreage of pecans, then let him follow by devoting some of the space around the home, along the drives and roadways, either now devoid of trees or occupied by those of no intrinsic value, to pecan trees. His children and children's children will bless and hallow the day that their ancestors were so thoughtful and wise as to plant trees of so great value and so permanent in nature as to be a blessing not only to himself (the planter) and his family, but the future generations yet unborn.

As comparatively little has appeared in the former proceedings of the Society relative to pecans and nut culture, I will undertake a brief discussion of the soils, methods of planting and caring for the young trees and groves, confining my remarks to the pecan, the most important of all the American nut-bearing trees.

SOILS

It has been well said by authorities on pecan culture that there are only two kinds of soil on which the pecan tree will not grow, first, land that is too wet, second, hard-pan land. These unfavorable conditions may be partially or wholly corrected, the first by thorough drainage, second by breaking up the hard pan with dynamite. With pecans, the same as with other crops and trees, the more fertile and productive the soil the better the tree growth, and if the fertility is well balanced, the better the fruit yield and final results. A good rule to follow is to select the class of land producing the best cotton, corn and other staple crops. A rich, sandy loam underlaid with a gray, yellow or reddish or yellow sub-soil, always watching for good drainage, to a depth of two and a half to three feet. Some land with a chocolate-colored subsoil is good, but as this chocolate sub-soil usually indicates hard pan, care should be exercised in selecting land with a chocolate sub-soil, avoid land with a stratum of hard pan, impenetrable to water, lying from twelve to eighteen inches below surface, underlaid with quick-sand, or land with a white sand sub-soil running into quick-sand from eighteen inches to three feet below the surface.

SELECTION OF TREES, DISTANCE FOR PLANTING, AND PLANTING

Surely no one conversant with horticultural progress would think of planting nuts or seedling trees to get a pecan orchard. Fifteen to twenty-five years ago there were few, if any, budded trees on the market. Therefore, all of the older pecan orchards throughout the country are seedlings. Every seedling tree is a distinct variety. There is of course little or no uniformity in the nuts or fruit produced by seedling trees, and on account of the tendency of trees to revert, or breed back, to original ancestors, most of the nuts are small, thick shell, even though large, thin shelled nuts were planted, and in many instances the nuts from seedling trees are bitter and therefore of no value whatever. This bitterness is largely accounted for by the fact that the pecan readily crosses with the bitternut and in seedling trees some of the bitternut ancestry may creep out in any tree, going so far in many instances as to show trace of the shape of the nut itself.

Budded or grafted trees of the best, large, soft-shelled varieties should be selected and secured from reliable nursery sources. The trees should be dug with either all of the tap root intact, or at least two and a half to three feet of the length of the tap root should be taken up when the tree is dug for transplanting. If the planter can afford it, the trees of the four to five or the five to seven foot size, as listed by nurserymen, should be used, as more uniformity and better results may be obtained from that size of trees than from the smaller sizes listed as one to two, two to three or three to four foot sizes.

The pecan should be planted a distance of from forty to fifty feet apart. If on comparatively light soil, where there will not be a rank growth of the trees, forty feet will be sufficient distance, but if the soil is heavy and fertile, producing a large tree growth, forty-five or fifty feet should be used.

Upon receipt of the trees from the nursery, special care should be taken that the roots of the trees never become dry, not for a single instant. Any broken or mutilated portions of the roots should be cut off so as to leave smooth sound ends. The holes for the trees should be dug of sufficient depth to admit the tap root without bending, and the planting of the tree the same depth that it originally stood in the nursery row. This usually requires a hole two and a half to three and a half feet in depth and sufficiently wide to admit of the lateral root without bending or cramping.

Do not use fertilizer at time of planting. Fill in good, well pulverized top-soil around the roots of the trees, firming the soil from the bottom to the top of the hole with a rammer in a similar manner to the way you would pack the dirt around a post, being careful of course to avoid bruising the lateral root with the rammer. When the hole is about half filled up, put in from ten to fifteen quarts of water. It is well to use this water whether the ground is dry or not, as it dissolves the clods and allows the earth to pack and settle around the roots much better than if not used. When the hole

is filled up to nearly the top, put on another ten to fifteen quarts of water, pack down firmly after the water is settled in the ground, and make a large ring around the tree in such a manner as to turn the water that may fall towards the center, and if to be had, mulch the tree to a depth of five or six inches with leaf mould, grass roots or stable manure, containing a large percentage of straw. After the tree is thus planted, the top should be pruned. The two to three foot size should be cut back to about eighteen inches. The three to four foot size, to about forty inches. The five to seven foot size, to about forty-five to fifty inches; and the large seven to nine foot size, about five and a half to six feet from the ground. At least this much pruning should be practiced in every case, even a more severe pruning would do no harm.

FUTURE CULTIVATION AND CARE

The ground around and between the trees should be cultivated every two to three weeks from time of planting until about July 1st to 15th, at which time cowpeas or a similar leguminous crop should be sown and allowed to cover the ground during the fall and winter, but by all means, keep the grass away from around the trees. Cotton and vegetable crops may be grown between the tree rows, leaving a space of from five to seven feet distance from the tree in each direction open for the benefit of the tree itself. If corn is to be planted, a distance of from ten to twelve feet should be left.

The second year of cultivation should consist of a thorough shallow plowing of the ground between the tree rows in March and shallow frequent cultivation up until about July 1st to 15th when the orchard can be "laid by" the same as the first year. A similar practice should be pursued for the third, fourth, fifth years, and, in fact, up until the time the trees are of a bearing size.

The only variation we would suggest would be the sowing of beggarweed in the orchard after the second year, or the planting of velvet beans after the third year, and letting them cover the entire ground, being careful to keep the vines from climbing into the trees. In all cases, keep down the crab and other grasses from around the tree. Leguminous crops such as peas, beggarweed and velvet beans can grow up close around the trees without injury, but grass is very injurious and best results may not be expected where it is allowed to grow around them.

Pruning should consist of training the tree up to the height to which you wish it to branch. Branches may be allowed to come from three to five feet from the ground, but in allowing them to come at this height, care should be taken that there is a leader running higher up. In future years it will be found that trees should not be allowed to branch below a height of from seven to eight feet. After a tree obtains a height of eight or nine feet, it is well to take out the head and cause the tree to branch out at that point, thus making an open spreading head. For the young tree, the first ten or fifteen years, the branching from three to four

feet is well, keeping in mind, however, the fact that the low branches will be removed in later years. Further than shaping the tree in the desired form and removing chafing branches, little or no pruning is necessary.

FERTILIZATION

With few exceptions, the soil in Florida and the south adapted to pecan growing is thin and light, requiring some fertilizer for satisfactory results. For the young, growing pecan trees, a fertilizer analyzing four to five per cent of ammonia, from seven to nine per cent. of phosphoric acid and from four to five per cent. of potash should be used. From two to four pounds should be used on the newly planted trees the first year, three to five pounds the second and from four to eight pounds the third and sufficient in future years to keep the trees in a healthy, vigorous condition. On the young trees, the fertilizer should be applied and a ring around the trees from twelve to twenty-four inches from the trunk, thoroughly hoed or raked in, applying it in two or three applications during the spring and summer. The second year it may be spread along the side of the trees for a distance of five to seven or even a greater distance from the tree as it becomes larger, harrowed or plowed in. The fertilizer to be applied in two applications, one in March, the second in May or June.

For the bearing pecan trees, fertilizer analyzing from three to four per cent. of ammonia, from ten to twelve per cent. phosphoric acid and three to four per cent. of potash should be used, applying from ten to fifty pounds per tree according to the size and the natural fertility of the soil. Application to be made in February or March.

SELECTION OF VARIETIES

Varieties should be selected showing the following points: good, average size, not necessarily the largest, as many of the varieties producing the largest nuts are shy bearers. Thin shell and good cracking qualities. Good color of nut and meat. And last but not least varieties producing uniform crops and coming into bearing at an early age.

Information as to these particular points can be obtained from the reliable nurseries offering trees, as well as information relative to trees wholly or partially immune from the attack of a disease known as the pecan scab, which I will touch on under the head of "Diseases and Insects."

In selecting your varieties and planning your planting, I would recommend the alternate planting of two or three varieties. If planting in a solid field, plant alternate rows of three or four varieties. If planting avenues or along road sides, alternate the trees in the rows. This is recommended on account of a point that is not fully understood either in the pecan or in many other lines of fruit culture—the self-fertility and self-sterility of the bloom, it having been demonstrated even in apple orchard planting that the orchards planted with the trees alternating either in the row, or in the field, produce more heavily and more uni-

formly than where solid blocks are planted.

The Department of Agriculture is now carrying on a series of experiments for the purpose of determining the self-fertility and self-sterility of the bloom of various varieties of the pecan. Until these experiments have been more thoroughly worked out, we advise the alternate planting as hereinbefore recommended.

INSECTS AND DISEASES

As stated in the opening of this paper, there are but few insect enemies of the pecan. The numerous scales do not seriously attack the pecan, the larger eating insect being the only one at all seriously considered. Of these I will give a brief description with suggestions of remedies for control.

Pecan Borers.—The pecan borer attacks the tree at various points along the body. Their presence may be known by the excretion of a gummy substance mixed with little shaving-like substance. In some instances only a slight depression or discoloration of the bark is noted. The borer may be removed with the point of a sharp knife or by inserting a soft annealed wire into the hole until borer is destroyed. If borer has gone deep into the tree, dip a little absorbent cotton in bisulphide of carbon, pack it into the hole and cork securely.

Twig Girdlers.—This is a beetle that lays its eggs on the end of limbs of pecans and walnut trees, and in some cases oak. After depositing the eggs, she drops back a few inches and partially girdles the twig. The swaying of the twig by the wind causes the end to break off and fall to the ground. These ends should be picked up and burned each fall to prevent the larvae hatching, burrowing into the ground only to come out in the form of a beetle another year to do further depredation.

Bud Worms.—This is a small beetle, a little smaller than the ordinary house fly. She lays her eggs immediately under the buds of pecan trees and some other nut and shade trees. In spring when the sap commences to flow, the larva hatches and burrows into the bud, killing the germ. This depredation can largely be controlled by spraying the trees, just before they commence to bud out, with arsenate of lead solution.

Case Rollers.—This is a small beetle that deposits its eggs along the limbs after the growth has started on pecans, walnuts, shade and some fruit trees. They continue their depredation for a period of three to four weeks. They may be controlled by spraying the trees with arsenate of lead solution.

Caterpillars (Web Worms).—Caterpillars, more frequently called web worms, appear in the persimmon, pecan, walnut, hickory and other shade and forest trees. They may be detected by webs growing in the trees, filled with small grayish worms. If these are left alone for a few seasons, they become quite destructive, often entirly defoliating the trees during the summer. The web nests should be destroyed as soon as noticed, by burning out or twisting them out with a long forked stick or pole.

Leaf Blight.—A blight that occasionally attacks the leaves of young seedling trees, causing the leaves to turn black and fall off early in the season. This may be controlled by an application of Bordeaux mixture. Grafted or budded trees are seldom affected.

Pecan Rosette.—A diseased condition of the foliage and terminal ends of the growing branches, that a few years ago was looked upon as a serious disease, but as the pecan-growing industry has advanced all conditions of the trees are being better understood, it is gradually disaping from all sections, the cause being atattributed to local soil conditions, such as soil acidity, soil poverty and unbalanced fertilizer.

The Pecan Scab.—A disease caused by fungus attacking the immature nut, leaves, and twigs. It may be detected in the form of a small black speck or dent each of which represents a starting point of the disease. As the season progresses, they enlarge and join one another, covering the whole surface, and in advanced stages cause the nut to fail to fill and generally drop from the trees prematurely. The control of the pecan scab seems to lie in the selection of such varieties that are apparently immune from its attack. Some varieties being especially subject to it, while others so far have proven to be entirely immune.

The following are a few of the varieties that are apparently immune from the scab: Bradley, Curtis, Delmas, Frotcher, Moore, Money Maker, President, Schley, Stuart, Teche. The Van Deman, a favorite variety with many, has shown scab in a few instances, but not to an alarming extent. There are no doubt many other valuable varieties that are immune, but these are the ones that have come under personal observation.

Further information along this line may be secured from the reliable nurserymen from whom you may secure your trees, and from the Department of Agriculture at Washington, D. C.

THE ENGLISH WALNUT

Dr. A. T. Cuzner

Mr. President, Ladies and Gentlemen:

The name of Juglans is a contracted form of the words Jovis Glans, i. e., the nut of Jupiter. It is a native of Persia and Asia Minor. From these countries it was carried to Rome, Greece, and thence to the countries bordering on the Mediterranean. These trees have been widely known in commerce under various names, such as Persian, English, French, Italian walnuts, also as Madeira nut, and recently as Chile walnut.

Its ancient name, Persicon and Basilicon, or Persian Royal nut, probably because either introduced by the Greek monarchs, or sent to them by the Per-

sian kings. Later, according to Pliny, the Greeks called the trees Caryon, on account of the strong scent of the foliage. The Persian, or English walnut, in its many varieties, has been planted almost everywhere in Europe as far north as Warsaw. In Great Britain it has probably been cultivated ever since the invasion of the country by the Romans. John Evelyn, in his "Sylva" (1664), says, "In Burgundy walnut trees abound where they stand, in the meadows of goodly lands, at sixty and a hundred feet distance, and so far as hurting the crops, they are looked upon as great preservers, keeping the ground warm, nor do the roots hinder the plow." Continuing his account, he further says, "Whenever they fell a tree, which is only the old and decayed, they always plant a young one near it and, in several places betwixt Hanan and Frankfort, no young farmer is permitted to marry till he can bring proof that he is the father of a stated number of trees."

There are seven or eight species of Juglans natives of the temperate regions of our own northern hemisphere, some extending as low down as Mexico and the West Indies. There are traces of the former existence of this, or a very closely allied species, in the Tertiary deposits in France, and elsewhere on the continent of Europe. The Walnut trees best succeed in deep sandy or calcareous loams. It requires free exposure to air, and owing to the immense size it attains, and its long life (there are trees in Switzerland 400 years old), it should never be planted closer than 60 feet apart. It can be propagated from seed, grafting or budding. The land should be well drained on which the English Walnut is planted. It is found to succeed well on ground where the Black Walnut lives.

Persian Walnut in America.—"The date of the first experiment in placing this nut in this country is now probably unknown, but the oldest tree that we have been able to find with anything like a satisfactory history is still growing vigorously at Washington Heights, on Manhattan Island, near 160th street and St. Nicholas Avenue. Fuller gave a brief history of this noble monarch of its race in the American Garden for September, 1888, from which the following account is condensed: "In 1758, Roger Morris, an English gentleman, built a spacious mansion on his estate at what, in later years, became known as Washington Heights. His grounds were well laid out for that time, and many rare foreign trees and shrubs planted, among them several, as then called, English walnuts. Whether these trees were raised from the nuts, or plants of some size imported, is not now known. Mr. Morris may have procured the seedlings from the Prince Nursery, Flushing, L. I., for this famous garden was established in 1713, forty-five years previous to the building of the Morris mansion and the planting of the grounds about it.

"At that period no one doubted the hardiness of the so-called English walnut in America, and as most of the nuts and trees procured for planting came from acclimated stock in Great Britain, or the cooler regions of Europe, success usually

attended such experiments. Our pioneers and horticulturists fully expected that the trees would thrive and bear nuts in abundance, and time has shown that they were not mistaken, although we frequently see it stated at this late day that the Persian walnut is not hardy north of the latitude of Washington, Philadelphia, or other cities south of New York.

"One hundred and thirty-eight years have rolled by since walnut trees were planted at Washington Heights, and at least one of the originals escaped destruction and holds its head aloft, defying the tempests which frequently sweep over that elevated and exposed spot on Manhattan Island. This veritable patriarch of its race in America is a monster in size, its stem between four and five feet in diameter at the base and more than seventy-five feet high, with wide-spreading branches.

"In the summer of 1776 the battle of Long Island was fought, and the American forces were compelled to retreat in confusion to New York, thence northward up the island; but when they reached Fort Washington, not far from the eleventh milestone on the old Albany post road, they made a stand and proceeded to entrench themselves at that place. This was in September, 1776, and General Washington took possession of the Morris mansion near by, making it his headquarters and, as this was at the season when the walnuts had reached an edible stage, we may safely presume, from his well-known predilection for such delicacies, that he and his army tested the quality of the Morris walnuts.

"This old patriarch has cast its shade over many a noted person in its time, for in 1810 the Morris estate passed into the hands of Madame Jumel, a lady long famous for her hospitality and the good cheer she extended to the surviving patriots of the Revolution. From 1810 to the time of her death, 1865, Madame Jumel's household always had an abundance of walnuts from the old tree, and one of the workmen on the place informed me that about two cartloads was considered a fair annual crop."

It cannot be many years before this old tree will meet the same fate that has overtaken many of its younger contemporaries, which were once growing in the neighborhood, for with the rush for building lots and the opening of new streets and avenues, trees are usually in the way and in such cases even patriarchs are not sacred, nor do they command much respect from our urban population." (Since writing the above this splendid tree has been destroyed.) A. T. C.

There have been many attempts to acclimate the English walnut to Florida soil but as yet have not obtained much success. We believe, as soil and conditions are peculiar in Florida, our success in acclimating new plants and fruits will come through seedlings. The best Florida oranges are natives to the soil. The law enunciated by Wallace and Darwin, "The survival of the fittest." That is, "that both plants and animals best calculated to adapt themselves to their en-

vironment and surrounding conditions, will survive." While thus surviving, they acquire characters and qualities they did not formerly possess. To illustrate this proposition, take the history of the Pomeroy strain of English walnut. The late Norman Pomeroy purchased from the Holland Land Company, in the year 1810 the land occupied by the family at the present time, and situated in Niagara County, N. Y. Mr. Norman Pomeroy visited Philadelphia in 1876 in order to attend the Centennial. While sitting on a chair outside the house, he noticed what a beautiful and unusually large English walnut tree shaded the place. On the ground directly under the tree he gathered nuts that had fallen during the night. Their flavor was more delicious, and their meat fuller than any he had before tasted.

Knowing that the varieties grown in California could not be raised at the north, he questioned his landlord and found this particular tree had been brought from northern Europe. He therefore gathered a quantity of these nuts and put them in his satchel, which he intrusted to a neighbor who was returning home. These nuts reached his home all right, but did not remain so long, for the children of the family and neighbors found the rare delicacies and ate all but seven. When he reached home he planted them, and succeeded in obtaining seven strong vigorous trees. These flourished, and within seven or eight years fruited, and have borne good crops ever since.

From these trees other trees were propagated, thus an endless chain was formed. These trees and nuts obtained the gold medal at the Pan-American expoition. It was found the meat from the nuts was of a different flavor from the ordinary imported varieties, having a suggestion of the hickory nut. The meat from a hundred of these nuts will weigh 20 per cent. more than from other varieties of the English walnut.

The shell is so thin that these nuts can be crushed in the palm of the hand.

These trees were named by the United States government after their originator: the Pomeroy English walnut, and it was from the Year Book of Agriculture that the writer first became acquainted with this valuable addition to our agricultural resources.

In March we received some California grown English walnuts from Oakland, California, also some of the Pomeroy strain from New York. Of these tested nuts, the ones raised in California had a decided black walnut oily taste. The Pomeroy had the suggested flavor of the shellbark hickory. Whence this difference? The Pomeroy, taking its origin in the neighborhood of the shellbark hickories, was pollinized by them. And this by means of the bees. On the other hand, it being found that the English walnut is readily grafted on the native black walnut, and does well thus propagated, assuming some of the characters of the stock on which it is grafted.

Now there is another character acquired by the Pomeroy strain of English walnut. The Juglans, as a rule, are a

long time coming into bearing. The Pomeroy, on the contrary, comes into bearing from 7 to 8 years. Whether it will continue true to seed, or finally revert to the original type, or gradually asume more nearly the character of the shellbark hickory, are questions time only can answer. So far these trees grow from seed true to kind. Hence Mr. Pomeroy will not sell seed for planting.

In answer to a letter of inquiry at the Pomological Department, Bureau of Plant Industry, Department of Agriculture, Washington, D. C., E. R. Lake wrote me as follows: "One word about the Pomeroy; it is a seedling, extremely hardy, medium-sized nuts, sweet and mild in flavor. I should think you ought to be able to grow a better variety in Florida if grafted on your native black walnut."

The Rush nut sold by Mr. Rush is a good nut, it being grafted on the black walnut and extensively planted in Louisiana.

The culture of these Pomeroy trees has proved a success in the northern, middle, western and southern states, having been tested by both government and state experiment stations. To me it appeals as a tree deserving of more attention than it has received heretofore. We propose to plant and test them on our home ground. We have some very large hickory trees near our house, one of which, with respect to bark, trunk and foliage, so closely resembles the Pomeroy walnut trees that the photographs of each might be mistaken one for the other. The Pomeroy, so far, has done well north and south wherever the hickory flourishes. Daniel Pomeroy, Niagara County, New York, has fine orchards of these trees and reports from many sections of the United States are extremely favorable.

So impressed had we become with the evidence of the merits of this strain, that having assumed the agency for the state of Florida, we have engaged to take as pay, or commission, trees instead of money. We also sent to Mr. Pomeroy for scions and grafted the same on young hickory saplings. We grafted a number of these saplings last year with pecans, only one of which took. However, this has grown at least three feet above the stock and branched out finely.

In the month of March we planted 24 Pomeroy trees on our home grounds at Gilmore, and the shoots they have put forth up to date have attained a length of twelve (12) inches.

Mr. Pomeroy writes me, "One trouble with many of the Caliofrnia varieties of English walnut trees—and this applies more especially to the Mayettes and Franquettes—is that the male and female do not bloom simultaneously. That he is receiving large orders from California and Oregon walnut orchardists, who want the Pomeroy to replace the Mayettes and Franquettes."

That "Plant Wizard," Burbank, has propagated an English walnut, but it is reported to have a bitter flavor.

Mr. Pomeroy reports that "A doctor of western New York called at the Pomeroy English Walnut Farm and told his experience in California with a grove of 60 acres of English walnut trees. His

1911 crop sold for $10,000. The doctor was enthusiastic over the Pomeroy nuts and trees, saying they surpassed his in every way."

So much for the favorable side of the question. On the other hand, we received from a prospective purchaser the following:

"Mr. Wright, former president of the Nut Growers Association, told me he had planted about twenty acres some years ago, and one tree was all he had left. They died out, year after year, after having been firmly established on land on which pecans are flourishing"

Now what caused these trees to die? and why was it that one lived? These are mysteries that ought to be solved. It may be that our dry springs are unfavorable to the growth of the walnut, which requires an abundant supply of moisture. Yet the trees of this family dislike their feet in the water. We had some promising seedlings killed by the drought of last year, besides several fine raspberry bushes furnished us by the U. S. Government Agricultural Department. On the other hand a neighbor of mine planted an English walnut near his home last year and cared for it. It is now some three feet high. Now, in conclusion, we believe it is better not to carry all our eggs in one basket. Hence let us see if we cannot make as great a success of the English walnut as California has made. With nut trees we don't have to build smudges to protect them from frost. Just now California receives more money from her walnut trees than she does from her oranges. I believe Florida can do likewise.

In California they depend largely on grafted stock. For this purpose they use the native black walnut for stock. For obtaining stock the nuts are selected from under the most vigorous trees. These nuts are first sprouted as follows: About March they are laid on ground that is not water-soaked. They are then covered with fresh stable manure. When these nuts are sprouted the best are selected and three are placed where the trees are to remain permanently. Mulch the ground thoroughly. About August it can be determined which of the seedlings are best suited for grafting. Suppress the others by cutting off below the crown. We must not be in a hurry to graft these young trees. Six years of age is soon enough. These grafted trees bear in two years.

A few words with regard to the planting and culture of the English walnut trees. They should be planted on any well-drained land where the sub-soil is not more than ten or twelve feet from the surface, wherever oaks, black walnuts or other tap-root nut trees grow. Forty to sixty feet apart. In holes eighteen inches in diameter and thirty inches deep. Two inches deeper than the earth mark showing on the tree.

And remember: That the trees need plenty of good rich soil about their roots. That the trees should be inclined slightly toward prevailing winds. That the trees should not be cut back. That the ground cannot be packed too hard around the roots and the tree. That the ground

should be kept cultivated around the trees during the spring and summer, and roots protected by a mulch. That English walnut trees should be transplanted while young, as they will often double in size the year the tap-root reaches the sub-soil moisture (that is, the moist earth). That tap-root trees are the easiest of all to transplant if the work is done while the trees are young and small. That trees sometimes bear the third year after transplanting three-year-old trees where the sub-soil moisture is within six or eight feet of the surface. That the age of bearing depends largely on the distance the tap-root has to grow to reach the sub-soil moisture.

The growth of the English walnut is different from that of most fruit trees. The small trees grow about six inches the first year, tap-root the same; the second year they grow about twelve inches, tap-root the same; the third year they grow about eighteen inches, tap-root nearly as much. For the first three years the tap-root seems to gain most of the nourishment, and at the end of the third year, or about that time, the tree itself starts its real growth. After the tap-root reaches the sub-soil moisture the tree often grows as much in one year as it has in the preceding three or four. If the trees are transplanted previous to the time that the tap-root reaches this moisture and before the tree starts its rapid growth, very few young trees are lost in the process of transplanting.

For orchard planting the trees should be placed from forty to sixty feet apart and by staggering the rows a greater distance is gained between individual trees. Any other small fruit may be planted in the orchard between the walnut trees or any cultivated crop can be raised satisfactorily on the same land, many orchardists gaining triple use of the soil in this way. Besides, the cultivation of the earth in proximity to the walnuts proves of great benefit to the trees. Before trees are planted the tap-root should be trimmed or cut back and most if not all the lateral branches trimmed from the tree. The tree itself should not be cut back, as is customary with other fruit trees, but by leaving the terminal bud intact, a much better shaped tree is developed. It is not necessary to prune English walnut trees except in cases where some of the lower branches interfere with cultivation.

We believe the best time for planting these trees in Florida will be found to be in the fall, for during our mild winters a root growth can take place and the trees be established to the soil by the time our dry spring sets in.

But you will probably say, "Why, doctor, do you harp so much on the English walnuts and have nothing to say for the pecan?" Gentlemen, the pecan needs no praise from me. There is already enthusiasm enough to support that most laudable industry. I have been infected with the pecan craze and have planted and grafted a number of trees. The walnut has a future and prominent nurserymen of both Florida and Georgia are providing for such by selling grafted

English walnut trees on the black walnut stock.

There are a few samples of the Pomeroy nuts for the Society's use. They are all I have left of those furnished me. There are also some illustrations of these trees, which can be passed around.

Vegetable Growing in Florida

J. F. Tenney

Mr. President, Ladies and Gentlemen:

It is generally the case that the most voluminous writers on agricultural subjects are those who know the least about it. A little book learning may go a long way. In the early days of orange culture in this state a young professional man came to my place and desiring to make himself useful desired to assist in caring for my young grove. He stated that he had made orange culture a study for two or three weeks, and if I would give him an axe and a saw he would prune my trees. His kindly offer was declined with thanks, and my trees were saved. It may be something after this good man's intention that induces the writer to attempt to give information to this intelligent audience on the subject of vegetable-growing in Florida. The northern raised man, who first beholds the methods of the average Florida farmer or trucker, says at once that our methods are not the best, that we are way off in the best method of cultivation. The writer had the same opinion in the early days, and determined to give these Florida Crackers a lesson in farming. He harnessed four mules to a big plow, and turned over one-half an acre of ground very deep. The result was different from what we expected, as it took nearly five years to sufficiently reclaim that piece of land to produce anything but stunted weeds! Our residence is about midway of the state, measuring north and south, and it is with this latitude that the writer is most familiar. We have found by actual experience that all of the garden vegetables that are grown in any part of the United States can be grown here in perfection. But they must be planted and cultivated at the proper season or time of year. This state is so long, covering so many degrees of latitude, that no fixed season can be made applicable to the whole state, and every producer must determine for himself the proper time to plant. With us, October is the best month to commence our fall and winter gardens, followed by successive planting until the spring months of March and April. I refer to cabbages, turnips, beets, onions, lettuce and the like. These vegetables can only be successfully grown on moderately moist ground, and even then the soil should be bountifully enriched with either chemical or stable manures. When planted and properly cultivated on that kind of soil these varieties of garden vegetables will grow to perfection. No better can be produced in the world, but it is practically useless to attempt to grow

them on the high sand ridges, or scrub oak lands that are found in some parts of this state. No amount of labor or skill will avail to produce anything but a stunted inferior plant. Several years ago an effort was made to produce Casava for its starch. The promoters selected high dry ground on which to plant, and I suppose the industry proved a failure, as I have heard nothing from it. Had these parties selected low, moist ground on which to plant, they would, no doubt, have met with good results. The writer has grown the plant on that sort of land with astonishing results, producing a yield at the rate of many tons to the acre. All varieties of the vegetable kingdom will succeed the best on low moist, but well drained soil, and even then sufficient means should be provided for irrigation. Ordinary truck farming is not pursued in my section to any extent, our efforts in that connection being extended to the kitchen garden, our main crop being confined to the white or Irish potato. This vegetable is extensively planted in this section with gratifying success. Our soil is what is called "flatwoods," so low that without drainage the ground will be nearly covered by the water that falls during our rainy season. The ground is plowed in the early fall months, is plowed into ridges and about the first of January the planting begins. The potatoes are cut into pieces of one or two eyes, and with a planter are dropped into these ridges about twelve inches apart. After the planting is completed, Disk cultivators are run between the rows, which builds up the beds. I should mention that, previous to planting, commercial fertilizers to the amount of one and one-half ton is sown on the ridges where the potatoes are to be planted. The growing crop requires some cultivation, but not too much. The roots of the plants should not be disturbed after it has reached a certain size. If the season prove a dry one the crop should be irrigated. If the season be wet, the ground should be as perfectly drained as possible. The cost of planting and cultivating an acre of potatoes will not vary much from seventy-five dollars, while the average yield is forty barrels or one hundred bushels suitable for transmission to market. Sweet potatoes do not require as rich land as do the white or Irish potato, but is cultivated in a similar manner by plowing the ground into ridges, but the best potatoes are grown from cuttings, growing the vines in seed beds and cutting the vines into lengths of about 18 inches long, laying them across the bed and pushing the center of the vine into the bed with a stick. Thus planted, the vine takes rest and the tuber is formed.

Sugar cane can be successfully grown all over the state, and in fact in every state bordering the Gulf of Mexico, but its cultivation being so much more expensive than in the tropical islands near us, is not extensively grown. The method of planting consists in plowing a furrow about six inches deep and laying the cane stalks lengthwise therein and covering with a plow. The cane stalk sends up a shoot from every joint. These shoots grow and form the stalk that is crushed, and the juice is evaporated, leav-

ing the sugar. In the tropics one planting will be sufficient for a term of eight or ten years, while in Florida it must be done every year. This with the greater expense for labor precludes the successful competition in the states with the tropical islands. In this short sketch I have mentioned but a few of the varieties of vegetables that can be successfully grown in this state.

Agricultural pursuits are in their infancy and little is known at the present time of the capacity of our soil and climate. In the early days ten bushels of corn was the average yield per acre. Now twenty-five and fifty bushels are grown as a second crop after white potatoes. It was the practice to purchase all the hay that was required from the more northern states, but today we are able to produce three tons of good hay from an acre, also a second crop. There seems no limit to the productions of this state, its climate alone being almost sufficient to induce an abundant vegetable growth and I predict that the day is not far distant when the poorest sand ridge in the state will be made to produce some crop that will richly pay the laborer. But I will close. The subject is too vast to be only alluded to on an occasion like this. This Society has a great work before it. Its labors have only just begun, and if my experience can aid it I am pleased to give it.

Legislative Report

Mr. Gillette: It will probably be recalled by those who attended the last meeting, that just at the close of the meeting, the Committee on Legislation reported. A bill, an agricultural bill, was presented which gave rise to considerable discussion. To settle the discussion, a motion was made that a committee be appointed to handle the matter. Three members of the committee represented the nursery men of the state, and three members represented the growers. The growers on the Committee, as appointed by our President, were Mr. Felt, Mr. Painter and Judge Stewart, of DeLand. The other members of the Committee were George L. Tabor, O. W. Connor and your humble servant. The meeting of the Society adjourned before this Committee had any time to meet and we held a session immediately after the adjournment. The report of that Committee was sent to the Secretary and published in the year book. For your information, I will read the report of the Committee.

SPECIAL COMMITTEE

A meeting of the Special Committee to act on the Horticultural Bill as drafted by the Legislative Committee of the Florida State Horticultural Society was held on May 5th, at the Aragon Hotel. Members of the committee present were Messrs. Gillett, Taber and Conner representing the nurserymen, Messrs. Stewart, Felt and Painter for the growers. Mr. Gillett was elected Chairman and Mr. Painter Secretary.

The following resolution was offered by Judge Stewart:

Whereas; The time being so limited, the bill being so voluminous and so many important questions being involved, and it being practically impossible to get this bill in proper condition to present to the Legislature and passed at this session therefore be it—Resolved, That the bill be referred back to the Florida State Horticultural Society with this suggestion, that a committee representing all interested be appointed by the president to reconstruct the bill to be presented to the next meeting of the Florida State Horticultural Society.

Seconded by Mr. Felt. Carried.

(Signed) M. E. Gillett, Chairman

After this report went in, the Committee was notified by the President of the Society that it would be continued as the Legislative Committee, and that we would be expected to make a report at this meeting. As you all know, it is quite difficult to get together a large committee, especially where the residences of each member are so widely sparated.

However, we kept in touch with each other on this matter, recognizing the vital interest, but until recently we did not get together to draft a bill. I had considerable correspondence with members of the Committee, especially with Mr. Tabor, who was in close touch with the subject, and he finally told me that he had had a good deal of talk with Prof. Rolfs on the subject and that he had in his possession, or, rather, in the library at the University at Gainesville, copies of all the State Laws with reference to the handling of insect pests and the horticul-

tural bills now in use in the different states. Prof. Rolfs finally came over to see him and they went over the matter very carefully, and at the meeting of the Committee, Mr. Tabor announced to us that we were indebted to Prof. Rolfs almost wholly for the report which we will submit. The Committee has felt, as most people generally do, that we ought to give the devil his due, so what credit there may be in this report, is due to Prof. Rolfs.

I will now read the report we have to submit:

CROP PEST BILL

A Bill to be Entitled:

An Act to Provide for the Appointment of a State Entomologist and Plant Pathologist (and to fix his term of office, salary and place of office), and the Employment of Necessary Deputies and Agents; to Make it Unlawful to Knowingly Grow, Sell, Exchange, Give Away, Transport, Keep or Permit to be Kept, any Article or Thing Infested or Infected with Injurious Insectc or Other Plant or Bee Pests, or Injurious Fungus, Bacterial or Other Plant or Bee Diseases; to Make It the Duty of the Board of Control to Make Rules and Regulations for the Prevention, Control and Eradication of Said Injurious Insects, Pests and Diseases; to Provide for the Oath and Bond of the State Entomologist and Plant Pathologist; to Provide for Printing and Distributing of Said Rules and Regulations and Bulletins; to Provide for the Prevention, Control and Eradication of the Mexican Cotton Boll Weevil; to Provide for the Costs and Charges to be Borne for Inspection, Treatment and Destruction of Property in the Interest of Horticulture and to Make the Same Liens; to Fix Penalties for the Violation of this Act and the Rules and Regulations Thereunder; to Make an Appropriation to Carry Out the Purposes of this Act; to Provide for Reports by the State Board of Education, Board of Control, Treasurer, and Comptroller; and to Repeal all Laws or Parts Thereof Inconsistent Herewith

BE IT ENACTED BY THE LEGISLATURE OF THE STATE OF FLORIDA:

Section 1. That the Governor shall appoint some person who shall be qualified by education, training and experience as State Entomologist and Plant Pathologist, who shall be confirmed by the Senate to carry into effect the purposes of this Act. He shall hold office for a term of four years and until his successor is appointed and qualified, and shall receive a salary of two thousand five hundred dollars per annum, payable monthly. Subject to the approval of the Board of Control, he shall employ such deputies and agents as he may deem necessary. He shall establish and maintain his office at the University of Florida.

Section 2. That it shall be unlawful for any person, firm or corporation to knowingly grow, sell, exchange, give away, transport, keep, or permit to be kept on his or their premises, or offer or attempt thereto, within the State of Florida, any article or thing infested or infected with injurious insects or other plant or bee pests, or injurious fungus, bacterial, or other plant or bee diseases. Provided, that it shall be a complete defense to any prosecution under this Act if any such person, firm or corporation shall immediately upon knowledge of such infestation or infection notify the aforesaid State Entomologist and Plant Pathologist that any such article or thing in his or their possession or under his or their control is so infested or infected, and shall within ten days after notice from said State Entomologist and Plant Pathologist, so to do, carry into effect his legal orders for the prevention, control or eradication of said insects, pests or diseases: and provided further, that it shall be a complete defense to any prosecution under this Act if any such person, firm or corporation not having any previous knowledge of such infestation or infection, shall, within ten days after notice of such infestation or infection from said State Entomologist, carry into effect the legal orders of said State Entomologist and Plant Pathologist for the prevention, control, or eradication of said insects, pests or diseases.

Section 3. That it shall be the duty of the Board of Control to make such just and reasonable regulations for the prevention, control and eradication of said injurious insects, pests, and diseases as may be necessary to prevent the introduction, increase or dissemination of the same.

Section 4. That the said State Entomologist and Plant Pathologist before entering upon his duties shall take before some person competent to administer oaths, an oath to faithfully perform the duties of his office, and enter into a bond with good and sufficient sureties in the sum of two thousand dollars payable to the Chairman of the Board of Control, said bond to be approved by said Chairman, conditioned for the faithful discharge of his duties. Said bond shall be prosecuted by the Attorney-General for any neglect of duty or abuse of power herein conferred, and if said bond should be forfeited, all

amounts collected from such prosecution shall be placed to the credit of the State Board of Education in the hands of the State Treasurer, by the said Chairman of the Board of Control, to be expended by the Board of Control for the purposes named in this Act

Section 5. That said State Entomologist and Plant Pathologist shall have printed and distributed to the press of the State and others interested, said rules and regulations and changes thereof and amendments thereto, and with the approval of the Board of Control, shall likewise have printed and distributed bulletins containing information pertinent to this Act

Section 6. That said rules and regulations shall provide for the prevention, control and eradication of the Mexican Cotton Boll Weevil.

Section 7. That said rules and regulations shall prescribe the just and reasonable costs and charges to be borne by the owners of property inspected, treated or destroyed by said State Entomologist and Plant Pathologist, his deputies and agents, and all such costs and charges, if not paid after notice thereof to said owner by said State Entomologist and Plant Pathologist, shall constitute a lien against said property and the premises upon which the same may be growing, in favor of the State of Florida, in accordance with the provisions relating to Statutory Liens of the Second Division, Title Seven, Chapter Five, of the General Statutes of the State of Florida. It shall be the duty of the State Attorney of the county in which the property is situated to prosecute said liens and to pay the proceeds thereof to the State Treasurer to the credit of the State Board of Education to be expended by the Board of Control for the purposes named in this Act.

Section 8. That any person, firm or corporation who shall violate any provision of this Act, or any rule or regulation thereof, or who shall interfere with said State Entomologist and Plant Pathologist, his deputies and agents, in the execution thereof, shall be guilty of a misdemeanor, and upon conviction thereof, shall be punished by a fine not exceeding five hundred dollars, or by imprisonment not exceeding six months, or both, in the discretion of the Court.

Section 9. That the State Board of Education, the Board of Control, the Treasurer, and the Comptroller shall each make separate and complete reports of all their respective acts and doings under this Act, as provided in Section 37 of Chapter 5384 of the Public Acts of the State of Florida

Section 10. That in order to carry out the purposes of this Act the sum of twenty thousand dollars per annum, or so much thereof as may be necessary, is hereby appropriated out of any funds in the Treasury, which sum shall be placed to the credit of the State Board of Education in the hands of the State Treasurer, to be expended by the Board of Control in the manner as provided in Section 34 of Chapter 5384 of the Public Acts of the State of Florida

Section 11. That all laws or parts of laws inconsistent herewith are hereby repealed.

Section 2. That this Act shall go into effect upon its passage and approval by the Governor, or upon its becoming a law without his approval.

This bill, as drawn by your Committee, is submitted to the Society. As you all understand, the Board of Control is a legally constituted body, and it was thought best to put this matter in their hands for several reasons. In the first place, we are liable to make some mistakes. Every state in the Union that has drawn up a similar bill, has eventually had to change it. I understand the bill in California has recently had to be overhauled and the bill they now have is very much shorter, very much plainer and more easy than what they have had heretofore.

If the bill goes through the Legislature, it is quite a process to have it changed. We present a bill, say, with all the duties prescribed. If we wish to make any changes, which we surely will, the Legislature will have to make them. We will have to go before them, and when it is desired to have these changes made, they may not be in session.

But with the Board of Control, it is an entirely different proposition. They are a legally constituted body and they would have the right to make any changes, as the matter now stands at any of their monthly meetings. This was what we did with the nursery inspection law. The bill was passed by the legis-

lature putting the matter in the hands of the Board of Control. The Board of Control took the matter up with the assistance of those who were familiar with those matters and it worked very nicely. We believe this same matter can be handled by the Board of Control better than any other way, and the concensus of opinion of your Committee is that we turn this matter over to the Board of Control.

I have nothing further to say about the matter. It is open for discussion, Mr. President.

Mr. Hume: What is your pleasure in regard to the report of this Committee.

Mr. Skinner: I move that the report be received and the Comimttee be retained to get it through the Legislature.

Mr. Berger: I think it would be well to continue that Committee, and allow it to make any changes it may see fit before presenting it to the Legislature. Let us not tie them up too tight. If they want to make any changes, let's let them do so.

Mr. Skinner: I accept the correction, and move that the Committee be given full power to make such changes as they deem wise.

Mr. Yothers: In the past, I have been more or less familiar with a great many horticultural laws, and for fear some may vote against this motion, I would like to say I think this is one of the broadest minded laws or proposed bills I have ever heard of or ever seen in print. I have a volume of the laws of the State of California and it is surprising to see the changes which have taken place in the last few years. As a matter of fact, I don't know what law they are now working under, as the copy of the last law I have is the law they were working under two years ago, and I understand it has been changed since that time.

A valuable feature of this law is the placing of so much power in the Board of Control. I think this proposed bill, if enacted into a law, would be for the best interest of the fruit growers and orange growers in the State of Florida.

Mr. Hume: You have heard the motion that the report be received and the Committee continued to look after the bill, with full power to act. I would like to have a second to it.

(Motion seconded and carried.)

Mr. Gillette: The Committee had some further communications on this subject which I thought I would not mention until after this matter is settled.

It is not to be presumed that all the members of the Legislature will realize the importance of the passage of such a bill as has just been read, as well as we do. Of course, there are a good many orange growers among them, and probably a great many who are having the same trouble we are having with whitefly and other insects, but there are a good many of them who do not care anything about it. This is going to be a hard matter to bring before the Legislature. It should be presented to the Legislature in such a manner that they will sit up and take notic and realize at once that this organization is asking them for something; for protection of one of the greatest industries in the State.

Of course, when the bill which has just been read is presented, there is nothing calling the attention of the Legislature to the gravity of these matters and the importance of the passage of this bill. We did not think it best that such a preamble should come before this Society, but we do think it best that a committee should be appointed to draft such a preamble, and at the same time have the committee given authority to choose a man to present this thing to the legislators at the next session. It seems that the Society should choose such a committee or such a man to see that this bill is presented properly. We would like to have you appoint a committee to draft such a preamble, and have the matter presented to the Legislature.

Mr. Hume: It appears to me, Mr. Gillette, that your idea was embodied in the motion: that is, that this same committee was to take charge of the bill and see it to its finality.

Mr. Gillette: Perhaps it was a mistake of the committee in not understanding it that way. We did not want to take too much authority. I assure you that the committee is willing to act in that capacity to help this matter along. We thought possibly there might be some better fitted to carry on the work, and that you might want to transfer the work, to some shoulders better equipped for it.

Mr. Hume: I don't like to work good horses to death, but I don't think the matter could be placed in better hands.

I am not a politician, and do not know how you would go about it, and I think we will just leave it with this Committee.

Mr. Hart: It looks like a good, healthy committee. I don't think we are in danger of working them to death.

This, as I understand it, is a Legislative Committee. Is that Legislative Committee confined to one particular bill?

Mr. Hume: Not at all.

Mr. Hart: Well, then, if we want an appropriation for this Society, we must take it up now and get rid of it. I am strongly in favor of giving them a little more work to do, and letting them take care of securing an appropriation, too. Why can't they work out both matters while they are at Tallahassee?

I think there is no question but that those men, as our representatives, could secure for this Society, $1,000 or $2,000 a year. We ought to let the legislature know that there is such a thing as a Horticultural Society. Don't you know, that if you want to like a person, the best thing to do is to do them a favor. If we can persuade the Legislature to grant us an appropriation, I think after that there will be no trouble about our getting what we want. I am ashamed of this State and of our Legislature if they do not recognize this body that is working for the upbuilding of the leading industry of the State. There is hardly any other state in the Union that has a horticultural society but that gives freely of its state aid, and plenty of it, and some of the horticultural societies can get almost anything they want from their legislature, and they do good work because they have money to work with. There are many lines of work we can do, or could do if

we had the money instead of being on the ragged edge of bankruptcy all the time. I dislike this idea of calling on our members every little while for contributions. I am ready to contribute as much as others, but, frankly, I do not like the idea of it. It does not seem a dignified way of supporting the association.

I am strongly in favor of asking the Legislature for an appropriation to help carry out this work.

I move that the Legislative Committee take up the matter of securing an appropriation from our Legislature for carrying on the work of the Horticultural Society. That can be discussed, and put in proper form, to be amended, if necessary.

Mr. Hume: It has been moved and seconded that our Legislative Committee be instructed to draft and introduce and see through the Legislature, a bill appropriating funds for the use of the Horticultural Society.

Mr. Hart: There may be some expense attached to it. They may incur legal fees, or something of that kind. If they do, I will pay my proportion, and more, towards that expense. I think there will be no trouble whatever in raising whatever funds are necessary to put the men there and keep them there to take the work up and see it through.

Dr. Berger: Someone directed my attention to a certain phase of legislation that the next Legislature will probably take up. I think it should be mentioned here. I understand there will be a very strong effort to abolish the convict lease system and in establishing or organizing a new system, which means, probably, large appropriations from the State Treasury to install this new system—possibly a million dollars. Of course, the money they are getting for the convicts will all be cut off. They will have to provide shelter and accommodations for them. It will probably mean large expenditures.

The way the matter was presented to me was this: under these circumstances, the Legislature will probably not be disposed to make any appropriation even for a horticultural bill.

I simply mention the matter here, in case it had not been thought of. There are others, perhaps, who can understand more about it than I do, so that the matter can be further discussed.

Mr. Gillette: Is that a reference to the Milton sugar farm bill? I would like to say that I don't think this Committee should be forced into the position of lobbyists. We are ordinary people—nurserymen and ordinary growers. Of course, there may be some who might act as lobbyists and do very well, but it seems to me that there is a way to bring about the desired results besides this.

Mr. Kilgore: The state is always short of funds—and so are we. We know the State collects a fertilizer tax, for which we, the growers, pay. Why should this not be turned back to us? It is our money, collected from us. Why should they kick on giving us a little back? We ought to kick on that. I should think we should appoint a committee to insist on their doing it.

Mr. Hume: You all heard the motion as it was put a little while ago. We will now vote on it.

(Motion carried.)

Mr. Gillette: One thing more about this appropriation. This Society can be of immense help to this Committee, if you will work with us. Last year, when the Nursery Inspection Bill was before the House, the nurserymen were in a pretty bad fix. We simply had to have an inspection bill or we could not ship our stuff, and we got busy. Every nurseryman was requested to get after his legislator or senator and anybody else who knew them or could have any influence. I wrote about twenty-five or thirty letters, and I doubt if ever a bill went through the Senate with the flash that bill did. We demonstrated in that instance what can be done. If every member of this organization will sit down and write to his or her senator or representative, setting out the facts as you have heard them here and urging our right to have what we ask for, I believe it will have a wonderful effect upon their vote when the matter comes up.

There is no reason why we should *not* have this bill passed. I will go so far as to say that if every member of this Society will get busy and help this Committee by writing to your representative in the House and Senate, talking to them when you can see them personally, there is no question but that the bill will be passed and we will get the appropriation we ask for. There is force in numbers, and let a goodly number of their constituents get behind them, and it will undoubtedly prejudice them in our favor. They want to give us what is desired and needed, but they want to know that we want it, and how badly we want it. The mere fact that Gillette and Tabor and Stewart and Felt and Connor and Painter ask them for something, won't have one-tenth the effect of a demand from the thousand members we expect to get. Think of it! One thousand men behind this bill, and each one insistent on its passage! That bill simply cannot fail to pass.

Mr. Hart: Let's do better than write them. I will follow my representatives all over my County, and I shan't leave them. If every member of the Society will do the same thing, we will get that help without any trouble at all.

Mr. Derby: If the Committee will get this bill introduced and get it so that it will have a number, and then let the Secretary notify each member that a bill with a certain number is before the Legislature, it will be very easy then to call the attention of our Legislators to the fact that we want bill number so-and-so passed.

Secretary's Report

Mr. President, Ladies and Gentlemen:

The twenty-fifth annual meeting of our Society will soon be a thing of the past, and I am glad to report that this meeting has not only been the best attended, but has one of the best programs and most thorough reports of any meeting up to the present time, thus showing that our Society is "improving with age".

There are very few societies that can boast of a quarter of a century's continued service, showing steadily improvements all along its different lines. Our reports are now sought for by Libraries and Experiment Stations to such an extent, that the Society can no longer furnish them free, but has to confine its reports to members only.

It may be interesting to some of the members to know that only three out of the original incorporators are still alive, Mr. H. S. Gateskill, of McIntosh Fla., W. S. Hart, of Hawks Park, Fla., and E. O. Painter of Jacksonville, Fla. Mr. Gateskill has not been in regular attendance, but promised to be with us today. Mr. Hart, you know, is always with us for he loves the society to such an extent that he has never allowed it to be "Heartless". Your Secretary has missed only one session in the twenty-five years.

The membership of the society shows a steady increase. In 1910 our membership enrollment was 221, in 1911, 341 and in 1912, 478. (Since writing the above we have added 229 new members.) At this meeting we have had an enrollment of 364 members in actual attendance.

The finances of the Society have improved since last year, and we have a nice balance in the Treasury, but this balance will not be sufficient to publish our proceedings this year, with the increased papers and illustrations. Then again, our balance is increased some by the sale of the membership buttons, which have not been paid for as yet. There are a number of these buttons left which can be had for $1.00 by the members. I am pleased to say that the ladies have been the most appreciative, as only a few of the pins are left, while there are fifty or more of the buttons.

The Secretary has been criticised by some for not issuing the programs earlier. This criticism is due to the fact that those making the criticism are not familiar with the work of getting out the program. This year a program committee was appointed, and I will ask Prof. Rolf to explain to the members why it is not possible for the Program Committee, or the Secretary to get out the program ten days or two weeks time before the meeting.

The increase in membership in a measure is due to the good work of a few

members. If all members would do likewise, 1,000 members would soon be enrolled. Suppose each member would do as well as Mr. Klemm. of Winter Haven, who sent in 27 names, and a large number of them are in attendance.

I beg herewith to submit my financial report:

E. O. PAINTER, *Sec'y.*

Cr.

Reports sold for years prior to 1911	22	$ 22.00	
Reports sold for 1911	140	140.00	
Reports sold to W. C. Temple	60	35.00	
Dues for 1912 to May 12th	478	478.00	
Life members	4	40.00	
Donations: Wm. Edwards $4.00, T. J. Nivins $1.00 W. C. Temple $100.00		105.00	
Checks from W. S. Hart $125.00, $388.92		513.92	
			$1333.92

Dr.

1911	
May 18 Telegram	$ .30
May 20 Stationery	2.45
June 1 Livingston & Young	2.10
June 1 Painter Ptg. Co.	9.00
June 9 Circular Letters	1.75
June 8 Stationery	.50
Aug. 23 Postage on reports	72.00
Oct. 4 Circular Letters	4.00
1912	
Feb. 24 Postage	4.95
Mar. 5 Circular Letters	4.75
Apr. 4 Kennedy Brown Co.	2.75
Apr. 4 Circular Letters	4.40
May 1 Telegram	.25
Apr. 15 Express-Gainesville	.16
Apr. 22 Express	.34
Apr 22 Postage	1.99
May 2 Postage	1.84
May 7 Postage	5.38
May 8 Painter Ptg. Co.	24.15
May 11 Painter Ptg. Co.	29.61
May 11 Circular Letters	3.60
May 11 Kennedy Brown Co.	4.00
May 11 Telegram	.35
May 11 Postage	1.00
Nov. 4 Painter Ptg. Co.	511.66
Nov. 22 W. S. Hart	125.00
Nov 23 W. S. Hart	2.26
Apr. 2 W. S. Hart	47.74
Secretary's Salary	100.00
	$968.28
	$1333.92
	968.28
	$ 365.64

Summed up as follows:

Telegrams	$ .90
Stationery and printing	602.62
Lighting	2.10
Postage	87.16
Express	.50
W. S. Hart	175.00
Salary	100.00
	$968.28
Check to W. S. Hart, Treasurer	$365.64

May 16th, 1912. Audited and certified to.

G. M. WAKELIN, Chairman.

Treasurer's Report

Dr.		Cr.	
1912		1911	
April 4 To Sec. Painter's check	$ 47.74	Nov. 23 By Balance due Treasurer	$ 47.74
May 16 Sec. E. O. Painter	506.64	May 16 Balance in Treasury	506.64
	$554.38		$554.38

W. S. HART,
Treasurer of Fla. State Horticultural So.

Executive Committee's Report

Jacksonville, Fla., March 18, 1912.

The Executive Committee of the Florida State Horticultural Society met in the Secretary's office on Monday, Mar. 18th. Those present were Prof. Rolfs, E. S. Hubbard, E. O. Painter and by proxy, Mr. Taber and Prof. H. H. Hume.

On motion the date of the twenty-fifth annual meeting of the Florida State Horticultural Society was set as commencing on Tuesday, May 14th, at ten o'clock, and to continue through the 15th and 16th.

The following local committe was appointed to work in conjunction with the Board of Trade of Miami: Mr. E. V. Blackman, Miami, Fla., Mr. M. S. Burbank, Miami, Fla., Mr. J. S. Collins, Miami, Fla., Mr. A. M. Griffing, Miami, Fla., Mr. H. S. Shults, Miami, Fla., Mrs. Florence P. Hayden, Cocoanut Grove, Fla., and Mrs. P. H. Rolfs, Gainesville, Fla.

The Secretary was instructed to purchase one hundred Society pins as per specimen exhibited, to be sold to the members for the Miami meeting at $1.00 each.

It being announced that the Florida East Coast Railroad would grant a rate of one fare plus 25 cents for the round trip, not only to Miami, but on the excursion to Key West and Havana, it was therefore agreed that the Secretary should announce an excursion to Key West and Havana for all members that desired to take advantage of same.

A committee on programs consisting of Prof. Hume and Prof. Rolfs was appointed. Special featurues for the program were considered and talked over and Prof. Rolfs was requested to use his best efforts in having as many special features added to the program as possible.

Miami, Fla., May 16, 1912.

The Executive Committee meeting was held at the Halcyon Hall. Those present were Prof. P. H. Rolfs, E. S. Hubbard, E. O. Painter, and by proxy, G. L. Taber, and H. Harold Hume.

Moved by Mr. Taber that the proceedings be puublished in the usual form. Carried.

Moved that the Secretary be instructed to furnish copies of the report only to members of the Horticultural Society. Carried.

Moved that one thousand copies of the report be printed, or equal to 50% in advance of the membership enrollment at the time of publication of the report. Carried.

Resolutions

To the Honorable Secretary of Agriculture, James Wilson, U. S. Department of Agriculture, Washington, D. C.

Recognizing the great benefits to the Citrus Industry of Florida by the experimental work done by A. V. Stuenrauch, in the Citrus Experiments as conducted by J. H. Ramsey and his associates, we earnestly request and urge the continuance of this work for the benefit of the citrus industry of the State.

Recognizing that your department took up this work voluntarily in Florida when its necessity was not recognized by our own people, it has become generally recognized and appreciated by the great mass of growers of the state, that the work carried on by your Department, has saved hundreds of thousands of dollars to the Citrus Industry.

And further that the work done has demonstrated that the field is so large and so much more is yet to be accomplished through the efforts of your Department, in this and other Citrus Growing States, that we request and urge that this work be continued in Florida, along such lines as may be the most promising to the Bureau of Plant Industry.

Recognizing the interesting work of Mr. Wolgum, and his excellent efforts under extremely trying conditions, in his service in India and other parts of Asia for parasites and predaceous enemies of the whitefly; Also

Recognizing that Mr. Wolgum was successful in bringing to Florida some species that are enemies of the whitefly in a living condition, and appreciating from the experience of Mr. Wolgum, the difficulty attending the securing of these parasites and keeping them alive, we believe that Mr. Wolgum is the man best qualified to return to the habitat of the whitefly and secure other specimens of parasites, and this Society extends to Mr. Wolgum a vote of thanks and express its appreciation of his efforts in behalf of the Citrus Growers of Florida in this expedition.

Therefore be it Resolved; That the thanks of this Society be extended to the Bureau of Entomology at Washington for the services rendered in behalf of the Citrus Growers of the State. Requesting and urging that this work be continued and to that end the matters be taken up in Congress through our Representatives and Senators and that an appropriation be secured for this purpose.

Resolved further; that we request our Secretary to forward a copy of these resolutions to our Representatives and Senators and to the Bureau of Entomology. Respectfully submitted,

P. H. ROLFS,
R. P. BURTON,
M. E. GILLETT.

MOSQUITO EXTERMINATION

Whereas: The Destruction of the Mosquito is a Paramount Issue involving the Welfare of the East Coast of Florida

And whereas, without the Mosquito, our Coast will be a paradise; unique in its Beauty, Restfulness, and Charm of Health; as well as an Area of Vast Commercial Importance

And whereas, also we feel that the United States Marine-Hospital Service is best adapted to undertake the Work of Exterminating the Mosquito, as their past work has shown

Therefore, be it Resolved: That we do hereby instruct the Secretary of this Convention to furnish a copy of these Resolutions to the Mayor, and Board of Aldermen of every town, village, and hamlet adjacent to the East Coast of Florida; and to every Board of Trade, and Business League; with the request from this Convention to secure names to a Petition, and otherwise to inaugurate a Campaign for a Solid Petition to be sent to the President, Senators, and Representatives.

And be it resolved also that we desire a Specific Appropriation of One Hundred Thousand Dollars for the purpose of having the United States Marine-Hospital Service work on our East Coast for the Extermination of the Mosquito.

FLORIDA FRUIT EXCHANGE

Whereas, The Florida State Horticultural Society recognizes the necessity of organization for co-operation in the marketing of citrus and other fruits in order that the horticulturists may realize the full benefits from the fruits of their toil, it being possible only by earnest co-operation to realize these results, and,

Whereas, the Florida Citrus Exchange has been of inestimable value to the citrus fruit industry of the State of Florida, the benefits of this organization extending to the State as a whole, and to everyone of the fruit growers in the State, the nurserymen, the business men, to the professional men and in fact to every business and industry of the State; stimulating investment and development as no other agency could; the benefits accruing to the citrus fruit growers has been at least three million dollars during the past year and realizing that every citrus grower marketing his fruit outside of an organization for co-operation in marketing is using his fruit and efforts against his own best interests, and the best interests of the citrus industry, therefore,

Be it resolved, that we heartily indorse the Florida Citrus Exchange and its methods of marketing the fruit. We further commend the thorough and lucid way of keeping all accounts and records, making it possible for every shipper to know all the details of route of shipment and all the details of sales. We further heartily commend the perfectly open and above board way of treating its members.

Final Resolutions

Whereas, the Florida State Horticultural Society in Convention assembled in Miami is about to adjourn for one year, to meet again at DeLand, it seems fitting that its members should express their appreciation of the several factors that have tended to make this meeting the great success that is has been. Therefore, be it

Resolved; 1st—That the thanks of this Society be tendered to the railroads of the state that have co-operated with us in giving us reduced rates, excellent service and courteous attention, and especially to the Florida East Coast Railway for its special low rates and willingness to do all they could to make the trip pleasant to the members.

2nd: That the thanks of the Society be given the Miami Board of Trade for the splendid arrangements provided for the comfort and pleasuure of our members.

3rd: That the thanks of the Society be voted the citizens of Miami, who have so hospitably entertained our members: and particularly to the Society of Elks, who have thrown their rooms open for our pleasure.

4th: That we thank Dr. McGonegal for his forethought in providing the electric fans scattered abouut our meeting place, and which have so added to our comfort.

5th: That we are much indebted to Griffing Brothers for the magnificent ornamental plants donated the convention hall for the occasion.

6th: That the thanks of the Society are due the proprietors of Halcyon Hall for the use of the magnificent auditorium and lobby so freely given our members.

7th: That to Mr. E. V. Blackman, the efficient manager of the entertainment committee, we are under many obligations for service and courtesy.

8th: That we tender our thanks to the press for the publicity given our meeting, for the account of our proceedings that they have, or will publish. The state press as a whole has been very liberal to us. We particularly commend the local press of Miami for its attention and courtesy.

9th: That the thanks of our Association are expressly due to the ladies of Miami for their efforts toward making our visit a pleasant and profitable one, and for their receptions and courtesies so kindly offered.

10th: That we appreciate the exhibit made by the Florida Experiment Station of the enemies and parasites of the citrus whitefly.

11th: That the thanks of our Association are especially due the officials of this body; to those men who have devoted so much of their time to our welfare, and

who stand ready to do so much in the future. Withouut their earnest efforts our Society might have died for lack of momentum, for what is everybody's business, is nobody's business; every live body must have a live head. This head has consisted of our President, Prof. H. Harold Hume, and as his faithful second has been our Secretary, E. O. Painter; since the inception of our organization we have had as our treasurer, W. L. Hart

Special mention should be made of the Executive Committee, consisting of Prof. P. H. Rolfs, E. L. Hubbard and G. L. Taber. It is the sense of this meeting that all of these officials have done their work faithfully and well.

Committee on Final Resolutions:

EDGAR A. WRIGHT,
R. E. ROSE,
B. F. TILLINGHAST.

Off to Cuba

Every time the Horticultural Society has a meeting there are always a few excursionettes worked in, to the delight of the members. It took Miami, however, to put on the finishing touches in a real excursion. After the meeting adjourned Thursday night, about 200 of the members took themselves to the sleepers that were in readiness, there to sweat and wait till the regular train would come along and pick up the coaches. Relief came about three o'clock, and as soon as the train was in motion, the heavy breathing told that the excursionists were lost in slumberland.

The sleep was not for long duration, however, as everyone was interested in that part of the trip that is truly called "over the sea," the wonderful work of one of the honorary members of this Society, Mr. Henry M. Flagler.

This wonderful structure of concrete and steel fairly leaps across the sea, tying island after island to the mainland and putting Key West on the map. At least, Key West is now better known than many larger cities in the United States on account of this marvelous tie of steel, cement, rock, sand and brains.

On arrival at Key West, a number of excursionists left the party voluntarily, because they wanted to see the great southernmost city; others were left because the steamer could not carry all the crowd. These latter, however, followed on the evening boat and arrived in Haana Saturday morning instead of Friday evening.

The trip across the channel was a short one, and, as the gulf was on its best behavior, a very pleasant one to all except a few who were so light headed that their previous meal aviated from their stomachs a la geyser.

The view from the deck of the steamer, as she passed into the harbor at Havana, was most interesting, especially as it is so different from any port of our own country. The grim walls of old Moro Castle on the left loomed up and the ponderous guns pointed as if they would frighten one into the fourteenth century; but there was nothing doing there, except the flap of the one-star flag as it floated out from the staff. The solid mass of buildings on the right, almost as far as the eye could see, gave a good idea of the size of Havana, the home of nearly 400,000 people.

The steamer was soon tied to anchorage and everyone anxious to go ashore. Their anxiety did not count, but it was the port doctor and immigration agent, who must pass on each member before shore leave would be granted. The doctor looked each passenger in the eye, and the immigration agent concluded each one had $30, so all could go ashore as soon as the tender arrived. "What a lot of use-

less waiting," many said, but then they had never visited a foreign country before and did not know how anxious all our foreign friends are to know that Uncle Sam's children have plenty of money to spend when away from home.

The tender arrived and soon the party were passing through the custom house. All got through O. K. except the Secretary. He had too many society badges and buttons for one man to wear so had to pay duty or put in bond—in bond they went.

Arrangements had been made in advance for hotel accommodations so that in a short time all were comfortably quartered in the Plaza, one of the best hotels in Havana. To follow the members and tell all they saw that was new, strange and interesting, would take a volume as large as our report,, so only a few of the "'high places" will be mentioned, and the reader left to imagine the rest.

Of course everyone wanted to visit Moro Castle and Fort Cabanas. These forts are said to have cost millions of money and taken years to build, and there is no doubt of it, but with our modern guns only a few hours would be needed to spoil that which it took years to build. The party was mostly interested in the method of structure and the dungeons and secret passages. Even some of the members who were over seventy years "young" insisted and did take in the whole trip, passages, dungeons and all. It is claimed, and it is true, no doubt, that many of the moats, rooms and passages were cut through solid rock. Entering one chamber which might have been used for a court room, a small opening was seen in the rear and through this opening all except the timid and "short of breath's" passed. The short ones stooping low and the tall ones doubling up like a jack knife. Sometimes the passage was up and sometimes down. It is said that some of the ladies actually had a case of "holding hands" before they got through. When the last decline was passed and the last elevation climbed, how good it did feel to be in the open air once more and see the sun shining although warm, and feel the free and untrammelled air against our faces.

Considerable time was spent going over the wonderful fortifications, looking at the rows of cannons with dates as far back as 1456, and wishing there was some good cool spring water to drink, and all the time thankful that it was the other fellow who had to build and inhabit the walls of masonry known as Moro Castle. The return to the hotel ended the first side excursion and all felt repaid for the time spent.

The second trip was to a big sugar mill near Guines. Long before the mill was reached immense fields of sugar cane were noticed on both sides of the road, and at every station cars were being loaded with the cane and whole train loads were being hauled to the mill.

What a tremendous building the mill is, covering acres of land and full of machinery, evaporators and sugar. As the cars of cane are received they are lifted and dumped into a huge hopper, and on an endless belt the cane travels

to a large crusher, from under which the juice runs like a young river. After passing the first rollers the crushed cane is passed under jets of warm water, and in turn again passes under another set of rollers and the water and what saccharine matter it may have dissolved, is pressed out, leaving the pulp dry so that it is conveyed under the boilers and burned to make steam to run the mill. It is a good thing that all the lovers of sugar do not have a chance to see the cane juice as it flows from the press to the vats because it does not look half as tempting as the cubes of sugar on the breakfast table.

The juice is run into vats where it is clarified with lime and then to the kettles and various pans till it finally reaches the centrifugal where the molasses is drawn out and the crystal dumped into a sack and is ready for export as raw sugar. The impression given of the sugar mill is the immensity of everything and the ease and regularity with which everything seems to be going on. On returning we pass through a portion of the Guines Valley which is said to be one of the most fertile sections in Cuba. The land is irrigated and it is said to have been in cultivation for 200 years.

One of the most pleasant trips on the island was that to the Castle, the house of Madam Aubren. Through Mr. Van Hermann the Society was invited to visit the home and grounds of this noted estate. On arrival at the outer gates the guard signaled our presence to the Castle and in a moment the huge iron gates swung open and the party entered. The grounds are beautifully laid out and planted to many varieties of trees, shrubs and vines that are found only in the tropics, the beauty of which can not be described so as to be appreciated by those who have never seen them. Scattered through the grounds were numerous cages containing different kinds of animals, by far the greatest number being monkeys and baboons. The cage of baboons attracted the most attention, on account of their large size, and the pleasure they expresed at the visit of horticulturists. One of the young ladies while trying to feed or hand one of them some fruit, got her hand very close to the bars when the largest baboon put his lips through the bars and kissed the back of her hand. This gave the young lady the distinction of being the only baboon-kissed girl in the party.

After spending some time looking over the grounds, admiring the beautiful trees, shrubs and vines, the Madam invited all into the Castle, where refreshments were served, and an opportunity given to inspect the beautiful furniture and relics that have been handed down from one generation to another. As it was the first time many of the party had ever been in a real castle, they enjoyed the visit very much.

At the close of the refreshments, a vote of thanks was extended to Madam Aubren for her kind hospitality, and as she is deeply interested in horticultural matters she was made an honorary member and presented with a Florida State Horticultural Pin. One of the attractive features of the estate was the avenue

FLORIDA HORTICULTURAL PARTY IN CUBA, AT THE HOME OF MR. VON HERMANN, SANTIAGO DE LOS VEGAS, CUBA

of Royal Palms leading to the gate. This avenue must have been half a mile long and the trees with their straight white bodies and crown of green made a view that must be seen to be appreciated.

The members of the society had been putting in full time and the weather favored all their excursions till Monday afternoon, when the downpour of rain kept them from attending the exercises at Camp Columbia. While resting from their journeys and talking over the pleasant things they had seen, the members were called to order by President Hume and the following resolution was offered by Mr. W. S. Hart:

"WHEREAS our society has been the recipient of many favors and has been shown courtesies which have made our sojourn in Cuba pleasant, and enabled us to see more of the beauties and interesting features of the island; therefore be it

RESOLVED that the members of the society here assembled do extend to Mr. Van Herman, Mr. Chas. Beatley and Mr. E. F. Curry, their hearty and sincere thanks for their untiring efforts in our behalf, which has added much to our enjoyment and our knowledge of the island."

Mr. Van Herman being present responded as follows:

Mr. Chairman, and members of the Florida Horticultural Society:

"It gives me great pleasure to reply to these kind resolutions in the name of the Cuba National Horticultural Society. We thank you for your kind reference to the assistance which we have been able to give you, to make your stay here as pleasant as possible. We only regret that it was not in our power to do more for you. In the first place we had no way of knowing how many would be in your party, and in the second place we had no means on hand as a Society to make extensive preparations at short notice.

"We thank you again for the compliment you have given the Cuba National Horticultural Society, and we are only sorry that so few of our members could share with us the pleasure of your most edifying companionship.

"In short, the pleasure of your visit has been ours. We are indebted to you for the stimulus given us by your generous delegation to our pleasant shores, where nature has done so much and man so little for the development of the Island along Horticultural lines.

"It is our hearty wish that you might meet with us during the annual meeting of our Society some time during the winter months

"Wishing you all a safe return to your native shores, with a strong desire to visit Cuba in the near future, where you will always and forever find the "latch string on the outside," and a hearty welcome to our hearts and to our homes."

Another side excursion that was a delight to all was the one to the home of Mr. Van Herman. The view shown with this report was taken in the yard of his beautiful house. Mr. Van Herman had many things of interest to the horticultural members, not the least of which was an orange and grapefruit grove that had

been left alone for four years. The only cultivation given was to mow the grass and weeds two or three times a year and let it mulch the ground. These trees bear good crops of fine fruit.

Nearly every orange grower of any importance in Fla. has heard of Adam Grey's grove in Cuba. It is one of the oldest and we understand one of the most profitable groves in Cuba owned by Americans. The grove is well kept and it is evident no labor or expense is spared to make it the best. The view in this report is taken in front of the house looking down an avenue with Royal Palms on one side. Mr. Grey, Jr., welcomed the members and took great pleasure in showing them around the grove.

Every time a boat sailed for Florida the numbers grew less until when time for the Isle of Pine excursion arrived, there was only a baker's dozen left. This number journeyed to Batabano by rail and from there by the steamer Colon to the island. At Juacaro there were automobiles in waiting and soon the party was whizzing over the beautiful hard roads of the island. A stop was made at Santa Fee for breakfast. After breakfast a visit was made to the famous springs and the beautiful home of Mr. Wall. Other groves were visited but as time was short the party moved on visiting many places and groves on the island and wound up at Neuva Gerona, where the boat was in waiting for the return trip. The stay on the island was short but owing to the liberality of Editor Willis and members of the Central Association who provided autos the party was able to see a large portion of the island. Everyone was so pleased with the warm hospitality they had received and the splendid opportunity given to see the groves and points of interest, that just before leaving, a set of resolutions were prepared and presented setting forth the pleasure the party had received on their visit to the island and their apreciation of same.

Taking it all in all the excursion of the Florida State Horticultural Society on the twenty-fifth annual meeting was a great success and no dissenting voices were heard.

It is said that every black cloud has its silver lining, so every bright day has its little black cloud. Not much, yet to those on whom the shadow falls it may mean deep sorrow.

The only cloud that marred the excursion was the sudden illness of Miss Doris Worcester of Pomona who with father and mother was expecting to join the party all through the trip. She was taken to the hospital, but after fifty-one days of battling with disease she fell asleep and was buried on the 20th of July at Pomona. Everything that could be done by loving hands and skillful physicians was done, but to no avail. The slender cord was broken and the spirit of the sweet and loving child was returned to her Maker. and the fond parents and friends left to mourn her loss.

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